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Electrical World

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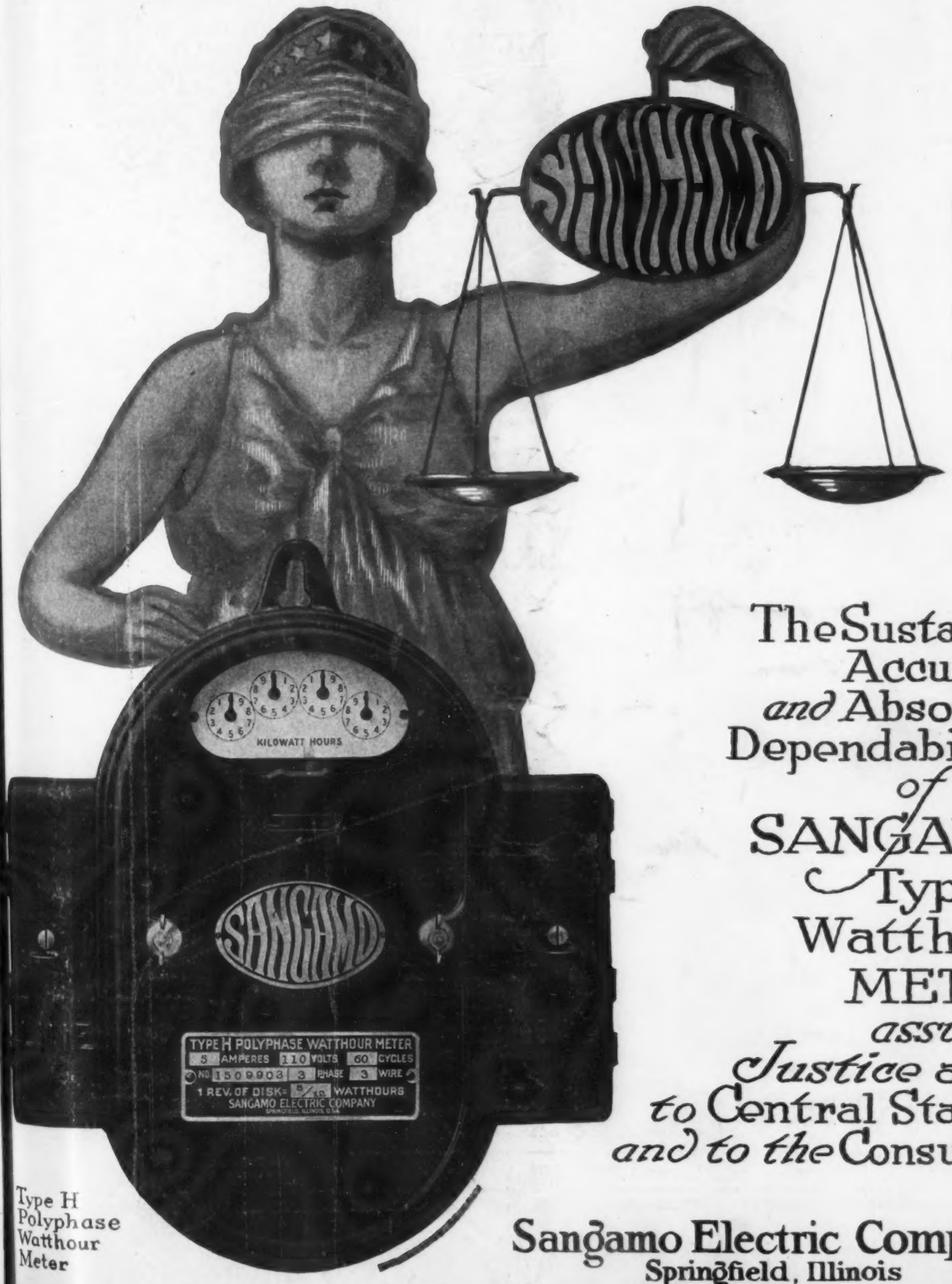

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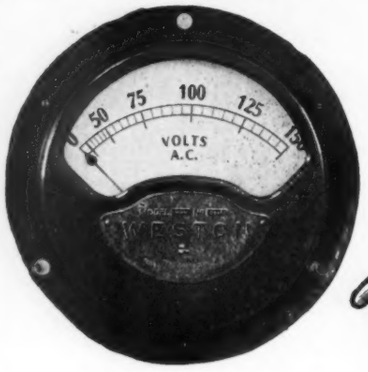

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Electrical World

New York, Saturday, November 12, 1921

The Power of the Greatest "Ism" in the World

AMERICA has brought two mighty thoughts out of the great world war. The first is that we do not live just in a country, but in a big wide world, where every nation's actions and affairs affect and influence us all. The second is that laws and habits and traditions *can* be changed if power is applied, and that therefore old, wrong conditions need not be suffered longer if a way can be devised to better them. These are great days for thinking men.

No person can say how history will mark the coming post-war period, but there is one condition that is sure to be writ large. We face an era of mass thinking, a new tendency on the part of all men and women to wonder why things should be wrong and talk about the making of them right. The world has evolved through many dragging centuries. Each generation has accepted as traditional the burdens and the evils that it found and passed them on with little change. There have been few periods of rapid renaissance. But the vast convulsions of the world war, social and economic, have shaken free these habits of men's minds, and they are thinking. We see it everywhere. And if we guide this new-born thinking power, great good will come of it.

Demagogues have charged that capitalism is the dominant force in America. But this is false. For in all history America is the outstanding example of an individualistic country. In the European social structure a man is born into a class and there he stays. He is born high or he is born low, and neither brains nor energy will raise the peasant to a peer, nor will the absence of them both displace a noble to make way for a better man of lower class. But in America there is no power that can prevent the smallest atom in the social mass from rising to the top, or hold it there once it has ceased to merit and maintain this high position. There are many "isms" in the world, but the greatest of all is individualism. And individualism rules in the United States.

So men and women in America are beginning to realize that the people—every people—have the power to shape somewhat the loads they bear by guiding and speeding the course of evolution instead of waiting in the old-time way. And they are thinking more deeply—about the cost of war, about labor, about capital, about taxes, government and education, about living. They see—we see—that, after all, things *can* be changed.

The world is as its people make it. *Collectively* we are the masters of our living and our industries. We can right wrongs if we will think and work together — here and throughout the world.

Comfort Avery Adams

Educator and engineer, who was largely responsible for the organization of the American Engineering Standards Committee and who played a leading part in the war stimulus given to electric welding.

ENGINEERING effort uncontrolled by reasonable standards soon reaches a point where progress is arrested because of high production and utilization costs. Each branch of engineering, therefore, has for years been developing its own standards. Because, however, of the complexity of interest and the growing interrelation of engineering effort it became apparent that some agency must be created to correlate these standardization activities. Such was the genesis of the American Engineering Standards Committee, the organization of which was brought about largely through the efforts of Prof. Comfort A. Adams. This organization, now in its third year, representing the national engineering societies and the government departments, has become the authoritative body through which standardizing activities are co-ordinated. It is also recognized as the national body for the handling of all international standardization. Professor Adams was chairman of the organization committee and first chairman of the standards committee itself.

To Professor Adams must be given the credit also for much of the impetus given to electric welding during the war. He was a member of the sub-committee of the Council of National Defense on electric welding, which was later transferred to the Emergency Fleet Corporation, with him as chairman. Under the stimulus of the committee notable advances were made in the art of welding, particularly in its application to shipbuilding. Several new laws bearing on the quality of welds and the structure and constitution of steel were established. Professor Adams, besides, was chairman during the war of the electrical engineering section of the National Research Council, the activities of which were chiefly related to the art of electric welding. He was first president of the American Welding Society and first director of the American Bureau of Welding.

Professor Adams was born in Cleveland, Ohio, Nov. 1, 1868. He received his electrical engineering education at the Case School of Applied Science, from which he was graduated in 1890. After a year with two Cleveland manufacturers he became an instructor in electrical engineering at Harvard and a student of mathematics and physics. He was advanced to assistant professor of electrical engineering in 1896, professor in 1906, and since 1896 he has been Lawrence professor of engineering. During the years 1915-1918, under the co-operative agreement between Harvard and the Massachusetts Institute of Technology, he was also professor at the latter institution. After the dissolution of that agreement by the courts he was the first dean, during 1919, of the reorganized Harvard Engineering School, but resigned to become chairman of the Division of Engineering of the National Research Council. This fall he returned to Harvard as dean of engineering. It was in 1917 that President Wilson appointed him a member of the general engineering committee of the advisory commission of the Council of National Defense. In this connection he outlined a scheme, later adopted in part, for co-ordinating the government purchase of war supplies.

Professor Adams is also a consulting electrical engineer and numbers among his clients both manufacturing and public utility companies. In 1904 he was a member of the jury of awards at the St. Louis Exposition. He is the author of "Dynamo Design Schedules" and has made many valuable contributions to the literature on electrical machine design. For years he has taken a leading part in engineering association work. He is a past-president of the A. I. E. E. and a member of the American Engineering Council.

Electrical World

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Volume 78 — New York, Saturday, November 12, 1921 — *Number* 20

Why There Are Objections to the American Valuation Plan

CLEARLY the American valuation plan is the most practicable method that has ever been proposed for administering the tariff. It will change our system of appraising goods so that a proper rate of duty will be levied on the basis of the wholesale price of similar competing goods in our own markets, where the government's authority can ascertain the facts. This is far more workable than calculation on foreign values affected by fluctuating currency and impossible of proof by the very limited number of government agents now engaged in checking prices abroad. The plan will also tax like goods alike, no matter where they come from, which under foreign valuation does not happen.

The idea is so sensible and appealing that it is hard to understand why it is being strenuously opposed. Investigation shows, however, that the opposition comes from four directions—(1) importers oppose it because it will raise the price of foreign goods and affect their opportunity for profit; (2) some exporters oppose it because they believe that foreign countries will retaliate with higher duties against our goods; (3) importing retailers, such as department stores, oppose it because it will decrease their margin of profit, and (4) some others oppose it because it will change existing methods and unsettle existing habits. Analyze these objections and they cannot stand against the obvious advantages. The importer must regulate his business to the needs of the country; the exporter cannot sacrifice 80 to 90 per cent of the business of our industries which is domestic to avoid the possibility of danger to some part of the 10 to 20 per cent of our output which is sold abroad, and the objectors to change must not prevail with this world-old argument against all progress.

The American valuation plan is sound. It makes for stability of trade, for healthy competition, for variety in importations. It will substitute knowledge and scientific regulation for guesswork and manipulation. The country needs it now.

A New Subject for the School Arithmetic

THERE is no good reason why the elementary facts on which the calculation of electric service bills is based should not be taught in the public schools along with the other weights and measures taught in simple arithmetic. In school textbooks the pupil is taught to deal with common weights and measures and the methods of computing the cost of the various articles that he must buy or sell in everyday life. Excepting the avoirdupois units of weight and those of linear measure, it is questionable whether any of these units enter into the daily life of the American family so fully as the units of electrical measure do. The engineer who allows his mind to dwell on the intricate foundation on which the system of electrical measurements is built may be inclined to declare that teaching the subject is impossible. But no one will deny that great good would result from a better popular understanding of such units as the watt and kilowatt, the watt-hour and kilowatt-hour and the horsepower. The calculation of the large majority of service bills is based on the use of these units in combination with simple arithmetic. The introduction of tables and examples showing how the kilowatt and kilowatt-hour are developed by the use of appliances and how these quantities enter into the service bill would be a powerful factor in placing the electrical measurements in which the public is most vitally interested in the same familiar light that from long habit has come to surround other units of measure.

Where Shall Utilities Eventually Obtain Funds?

BEFORE the days of large government expenditures, when Congressional appropriations were reckoned in millions, not billions, the question of tax exemptions was an academic one. Now, however, the total of tax-exempt securities has grown so large as to cause concern, as well it might. What with eighteen billions of Liberty and Victory bonds outstanding, one can get some conception of the enormity of the problem, and even then the tale is only partly told. It is conservatively estimated that thirty billions (the national wealth of Japan is only approximately twenty-five billions) is invested in tax-exempt securities, and the printing presses are issuing millions more daily. Obviously, if private industry and initiative are not to be hampered, much less choked, a halt must be made; otherwise we shall soon drift into a condition of state socialism with the government running everything. This, of course, is un-American and would not be tolerated for one moment. Both England and Canada have sensed this danger, and in Canada the policy of exemption has been abolished without detriment to the salability of government bond issues, while in England the income from government securities issued before and during the war is taxable except to non-residents. The situation as it exists in this country at the present time is such that a 5 per cent tax-exempt security will yield to a wealthy man as great a return as a business enterprise paying from 12 to 17 per cent.

While electric public utilities have been able to raise many millions through the sale of securities locally to employees and patrons of the company for the erection of new stations and transmission lines, they must look to wealthy capitalists for a greater part of the funds. Hence the necessity of a change in a system of taxation which forces the investment of large fortunes in tax-exempt securities. Within a reasonable time, when the industries of the country shall move upward, the sum total of the financial needs of electric public utilities

will be very great. To the extent that the utilities are hampered in obtaining the necessary capital by the competition of tax-exempt securities will municipalities and states be encouraged and stimulated to embark in quasi-public enterprises, many of which will ultimately end in disaster. The function of government is to regulate and not to operate, and we cannot cure too much government with more government. By placing the incomes from all bonds on a parity the slogan of "Less government in business and more busness in government" will be made effective.

Industrial-Plant Electrical Specifications

SPECIFICATION writing is a science, but specification writing by one not properly trained becomes a burden on both the buyer and seller of electrical and allied equipment. Manufacturers have spent huge sums in experimentation to perfect apparatus which the best of engineers have toiled over in designing and watched over in operation for years to the end that standards shall be evolved which mean low cost and the greatest reliability. If standard apparatus is known to be applicable in any particular case, it is idle to draw detailed specifications to cover its purchase. If it is not known that standard apparatus is available, or it is thought that something different might be better, the writing of specifications in too great detail becomes an abomination to the manufacturer who must twist his ideas and ideals in a direction away from his standard practice. And the specification writer pays the bill. Common sense indicates that every one concerned would benefit if the purchaser were to limit himself to describing accurately operating conditions and duty requirements and let the manufacturer submit his bid on the equipment his experience has shown to be most suitable. Then, if changes should seem advisable, a mere intelligent basis would be provided for working them out.

The 5,000-Volt Limit Again

THE 5,000-volt limit still persists as a source of controversy in connection with the joint usage of poles for power and communication purposes. A recent letter written by the plant superintendent of a telephone company and dealing with a question of joint use at a voltage above that figure makes the direct statement that this limit has been agreed to by the National Electric Light Association as the proper one. Perhaps no one subject has been productive of so much controversy as this one of voltage limit. Starting with the old crossing specifications and the older joint-pole agreements, the telephone interests have insisted that this was the limit to which they could safely work their protective equipment and that the general insulation of their plant would stand no more. The power interests have just as strenuously insisted that they cannot tie up their pole lines by such a limit, since all developments point to a more or less general use of higher distribution voltages. The rural-service line developments of the past two or three years unmistakably point to the need for distribution voltages over wide territories that will be far above the limit named.

The statement cited was probably due to ignorance on the part of the plant superintendent, but such ignorance is the type that does a tremendous amount of harm. In the heat of argument over what shall be done in specific cases, a statement of this sort from a responsible official in a position to know better always breeds suspicion of ulterior motives. The telephone people are entitled to their own opinions in the matter and have the right to fight for them to the limit of their ability. The power interests likewise are free to present their own view of the situation. It should not be necessary to say that the N. E. L. A. has never through its committee or its executives recognized a voltage limit for joint construction or for any other purpose. Whether such a limit shall be established, and if established, what it shall be, will be determined by economic factors affecting each industry and by future developments making for safety to the public and protection to the telephone plant. To say that there is no progress possible in these latter directions is to belie past industrial history.

The Interests of Electrical Men Cannot Be Sectionalized

ELECTRICAL men throughout the country are distressed over the situation, outlined in last week's issue, which has arisen between the National Association of Electrical Contractors and Dealers and its members upon the Pacific Coast. For the electrical industry is more than a mere local business. It is a great evolutionary force which is molding new industrial, social and economic conditions throughout the world. It is a fountain from which is flowing an idea that has spread the length and breadth of our country until it has come to be an influence in every home, in every life. The purpose of electrical men in the North, the East, the South or West is ever the same —to carry electricity into all homes and industries for saving labor and improving health, comfort and happiness. There is nothing sectional about this common purpose, nor in the way they go about it in any state.

In recent years, however, there has developed a feeling in more than one locality that conditions there are "different," and that because of intervening distance, the affairs of the Coast, for instance, must be considered as a sectional problem. This sentiment has led to unfortunate misunderstanding between the contractor-dealers of California, Oregon and Washington and their national headquarters in the East, which has culminated in the actual secession of these three groups from the national body. And there it stands—a dangerous precedent.

The principle of national organization, interdependence and solidarity is as deep and as broad and as enduring as the nation itself. The arguments for membership in any such national association are many. The argument against it cannot be weightier than that it does not pay its cost—which in the case of the contractor-dealers averages, across the country, but $12. This would seem to be a small amount to pay for the advantages that could be made to accrue from national contact and national co-operation in any national association work.

But this is more than just a controversy. There is a broad living principle involved, for the West needs the East and the East needs the West. No man can say that the East has no concern with West Coast agricultural products, for instance, or that the West does not depend upon the East for capital and for manufactures. Nor could he say that such a sectional policy can be

right unless he thinks the Coast should fight its battles unassisted if a war should come with a Pacific power—which God forbid!

There are tremendous possibilities in local work among electrical men on the Coast. No doubt of it. There is need for local work in every state. But these local activities *can* be co-ordinated with national plans and achievements, and membership in a national association *can* be made worth its cost to electrical men everywhere. It is to be hoped that further thinking will lead to a sensible adjustment and cure this apparent breach between two sections of an industry whose broad interests actually cannot possibly be separated.

Balanced Production the Key to Orderly Prosperity Everywhere

IN BUSINESS circles such terms as "buyers' strike," "deflation" and "price reduction" have side-tracked attention from the fundamental factors that control orderly prosperity the world around in normal times. Evidences have been frequent of rising prices with a shortage of commodities and of falling prices as the market became saturated, but too infrequently has it been realized that in the controlling economic law of supply and demand the extent of the supply and the extent of the demand must equalize in the long run even if not concurrently. In the electrical industtry, for instance, copper comes into the market as a raw material supply, but it also comes into the market as a demand for electric service, in the form of transmission and distribution line conductors and for motors, generators and other products which use it in construction. In the same way every commodity enters into the circle of production and use, and only in so far as every producer is a consumer is the whole process economical and successful. No one essential element in the circle of producer and consumer can either multiply production beyond normal consumption or hoard commodities for long without serious reaction of the economic law of supply and demand, such a reaction as has already been evident and from which we are gradually emerging as more activity is shown in intensified selling and tendencies to balance demand against production and existing stores of goods already hoarded become evident. An interesting instance comes from the Southern States, where a short cotton crop combined with a gradual increase in local and foreign demand for the staple has brought about improved conditions in all lines of business during the past six months which are probably more marked than in any other section.

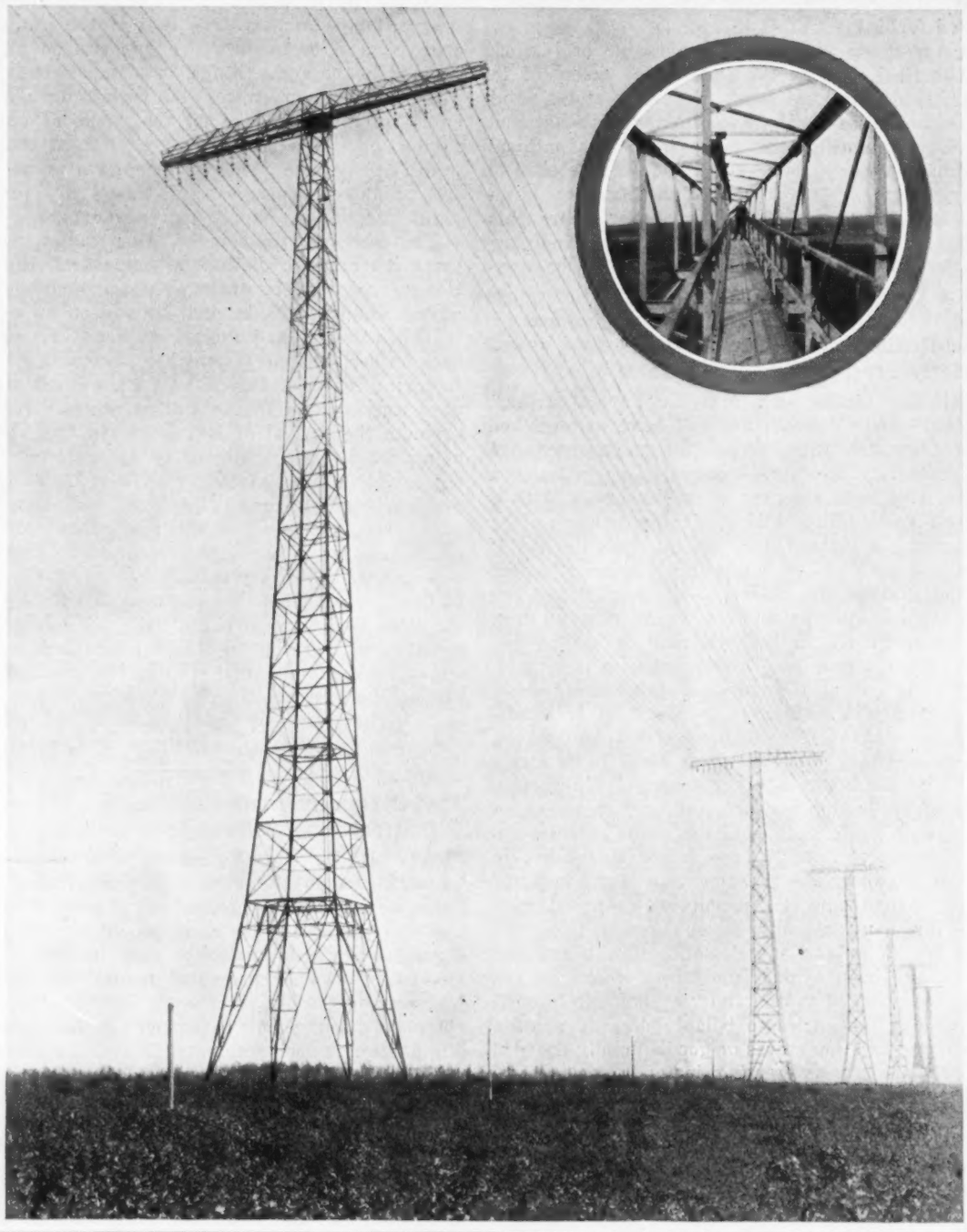
In the same way these fundamentals apply to the world at large, for order and prosperity can return only when all nations fall again into harmonious economic relations with one another. This point was clearly brought out by Dr. B. M. Anderson, Jr., economist of the Chase National Bank of New York, recently, before the American Manufacturers' Export Association, when he stated that there is no indication that there has been overproduction in the United States, but rather a maladjustment of production. He said: "It is impossible for a people to produce more than they can consume so long as they produce things that they want and produce them in right proportions. Production and consumption grow together. It is out of production that the income of the country comes, and the income of the country is spent for goods and services. If we substitute the word 'utilize' for the word 'consume' the proposition is strictly true that if the productive resources of a community are apportioned rightly and devoted to the right things, it is impossible to produce more than we can utilize, even though our current consumption may not take up the whole of our current production. The increase of capital in the form of durable, long-time goods is obviously a means of utilizing productive energies. If things are produced in right proportion, supply can never exceed demand."

The economic problem of American manufacturers therefore has two distinct aspects—first, the acceleration of sales effort among basic industries so as to adjust supply facilities and demand on an equal basis in this country, and second, to assist Europe to get back on her feet and resume her place as a great manufacturing center and an outlet for the raw material supplies concentrated in the United States. Just how to promote the revival of European industry in the face of a debt of sixteen billions of dollars owed to us has not as yet been satisfactorily answered. To ignore the problem for this reason, however, and hope that the world will ultimately shake itself into some normal course, can only prolong the condition holding back our own prosperity. Every manufacturer is in possession of facts concerning his own business and if he will show the same desire to co-operate with the agencies of our government working on this problem and other economists making individual studies, the resulting solution will not be disappointing. Pessimism and indifference at this time have no logical place in the thinking of those who expect to be in business next year.

Traffic Accidents and Street Illumination

THERE has been an enormous increase of traffic accidents in the streets of American towns and cities, an increase altogether out of proportion even to the very large increase of automobile traffic. An important contributory cause of night accidents was considered in a paper presented before the Illuminating Engineering Society recently by Messrs. Anderson and Haas. It discussed the part played by insufficient street illumination in such accidents. A thorough study of the distribution of traffic accidents with respect to the hours of darkness brings out the important, though not unexpected fact that more than one-sixth of all the night accidents are due to driving in inadequate or improper illumination. The study indicates that five or six hundred lives annually are sacrificed to this particular sort of inefficiency, and that the money equivalent of the various forms of accident chargeable to poor lighting is somewhat greater than the total expenditure for street lighting in the United States.

Much has been done in various parts of the country through automobile headlight regulation, but, as was pointed out in another paper at the same convention, there is a great deal to be said for lighting city streets so efficiently that the main reliance need not be placed on headlights. Experiments indicate that dangerous spots where night traffic is a serious menace can be sufficiently well lighted to reduce the accident hazard greatly without particular difficulty or forbidding expense. Certainly there are many places where this should be done. The situation is really grave, and any reasonable method of amelioration should be enforced.



World's Greatest Radio Station on Long Island Formally Opened

THE remotely-controlled radio transmitting station at Rocky Point, Long Island, which was formally opened last Saturday, is the largest and most powerful station in the world, its sending range being virtually world-wide. In the ultimate it will far surpass anything else of its kind now considered. Although only two rows of six towers each are installed at present the ultimate development will involve twelve antennas radiating from a single point like the spokes of a wheel. Three spokes will be for transpacific communication or radio-telephone purposes to Europe. Another group of three will be for South America, and each of the remaining spokes for England, France, Germany, Sweden, Denmark and Poland respectively. No conception of the magnitude of the towers and spans can be obtained from the accompanying illustrations, but the insert above indicates the size of one-half of one crossarm. The towers are 410 ft. high and 1,250 ft. apart. The crossarms are 150 ft. long and support sixteen parallel conductors. The construction work was supervised by the J. G. White Engineering Corporation and the station is owned by the Radio Corporation of America. For further details see page 987.

Why Colorado River Should Be Developed

Steady Growth of Load in Southwest Will Force Early Hydro-Electric Development—Protection of Imperial Valley Against Floods and Need of Water for Additional Irrigation Are Other Factors

AT THE HEADWATERS OF THE COLORADO RIVER

THERE are at least three reasons for considering the development of the Colorado River at this time. They are (1) the need of protecting against floods the lands now irrigated with Colorado River water; (2) to obtain a supply of water for additional irrigable lands, and (3) the urgent necessity of supplying additional hydro-electric power in the surrounding country and especially California.

The greatest need for haste in the control of the Colorado River is the flood menace to the rich Imperial Valley in southern California, which lies 250 ft. (76 m.) below sea level in some places and comprises 400,000 acres (161,000 hectares) of land irrigated by the Colorado River. There is a grave danger to the Imperial Valley in the fact that the river is likely to overflow its banks and cut a deep channel directly to the valley. Such an occurrence, in fact, took place in the years 1905 and 1906, and the break was closed only with the greatest difficulty. The increasing danger to the Imperial Valley has caused the residents there to demand that Congress take action looking toward the control of the floodwaters of the Colorado River.

In a report dated Nov. 27, 1920, Director Davis of the Department of the Interior transmitted to the Secretary results of a preliminary investigation under the provisions of the Kincaid act (passed in 1920) which included data regarding the entire river and preliminary studies of the cost and feasibility of various storage reservoir sites on the river. A final report authorized under the same act was presented on July 8, 1921, and the recommendations which form a part of that report are as follows:

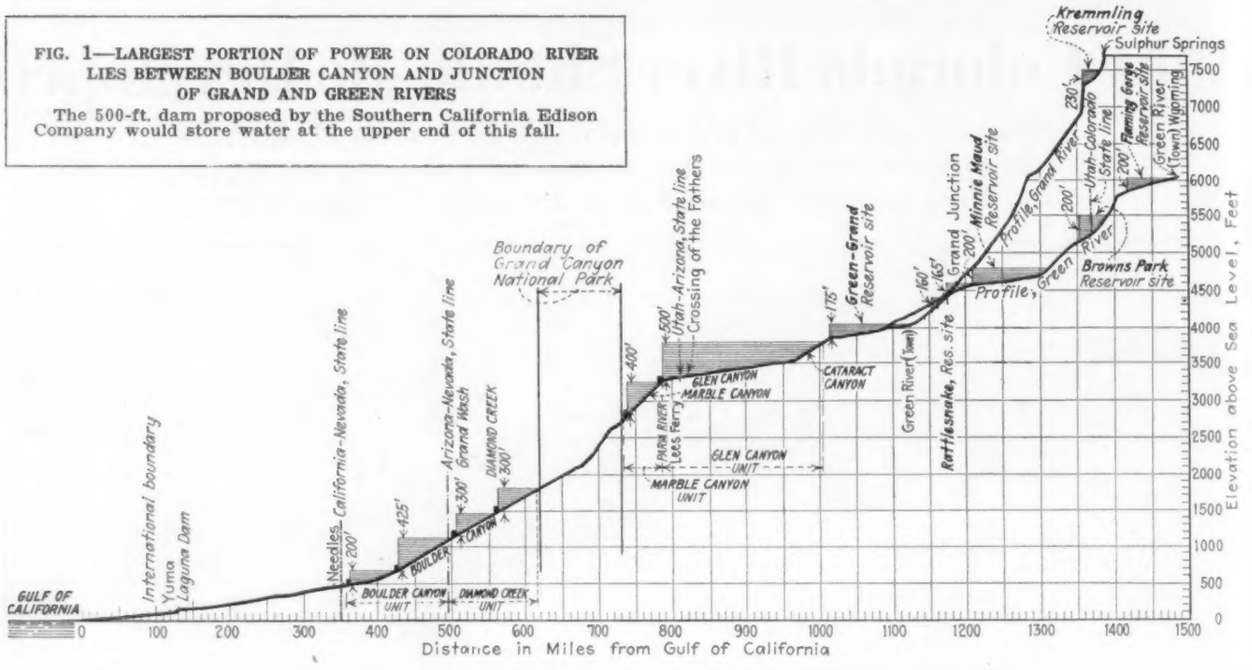
1. That through suitable legislation the United States participate in the construction of the Boulder Canyon

TABLE I—FILINGS WITH FEDERAL POWER COMMISSION ON COLORADO RIVER

Permit No.	Applicant	Location	Operating Rating (Hp.)	Rating to Be Installed (Hp.)
90	F. G. Baum, San Francisco, Cal	Little Colorado River at Grand Falls, Ariz	9,400	15,000
91	F. G. Baum, San Francisco, Cal	Black River, Ariz	6,300	7,000
30	Beckman & Linden Engineering Corp., San Francisco, Cal	Colorado River, Ariz	126,000	200,000
33	C. A. Heberlein, Prescott, Ariz	Cataract Creek, Grand Canyon National Park, Ariz	(Canceled)	.....
59	Edward L. Bayard, Seligman, Ariz	Hualpai Indian Reservation, Colorado River, Ariz	1,400,000	1,800,000
111	Southern California Edison Co., Edison Bldg., Los Angeles, Cal	Three power developments in Colorado Canyon, Colorado River	2,500,000	3,300,000
121	James B.Girand, care of Parsons, Klapp, Brinckerhoff & Douglas, 84 Pine St., N. Y. City	Colorado River near Diamond Creek	60,000	120,000
158	Utah Light & Power Co., care of M. O. Leighton, McLachlen Bldg., Washington, D. C.	Green River above Green River, Utah	80,000	100,000
165	Utah Power & Light Co., care of M. O. Leighton, McLachlen Bldg., Washington, D. C.	Green River above Bridgeport, Utah	100,000	125,000
202	Green River Power Co., Pacific Electric Bldg., Los Angeles, Cal	Green River, from point near Green River, Wyo., to its junction with Grand River, Utah	912,600	1,200,000
230	James B.Girand, Gooding Bldg., Phoenix, Ariz	Colorado River at the mouth of Andrus Canyon	65,000	130,000
240	Steve Consolidated Copper Co., Phoeniz, Ariz	Big Williams River	14,000	28,000
231	James B.Girand, Gooding Bldg., Phoenix, Ariz	Colorado River just above Pierce's Ferry	65,000	130,000
238	City of Los Angeles, Cal	Boulder Canyon, Colorado River, Nev. and Ariz	600,000	800,000
258	Southern California Edison Company	Boulder and Pyramid Canyons	.....	1,200,000

FIG. 1—LARGEST PORTION OF POWER ON COLORADO RIVER LIES BETWEEN BOULDER CANYON AND JUNCTION OF GRAND AND GREEN RIVERS

The 500-ft. dam proposed by the Southern California Edison Company would store water at the upper end of this fall.



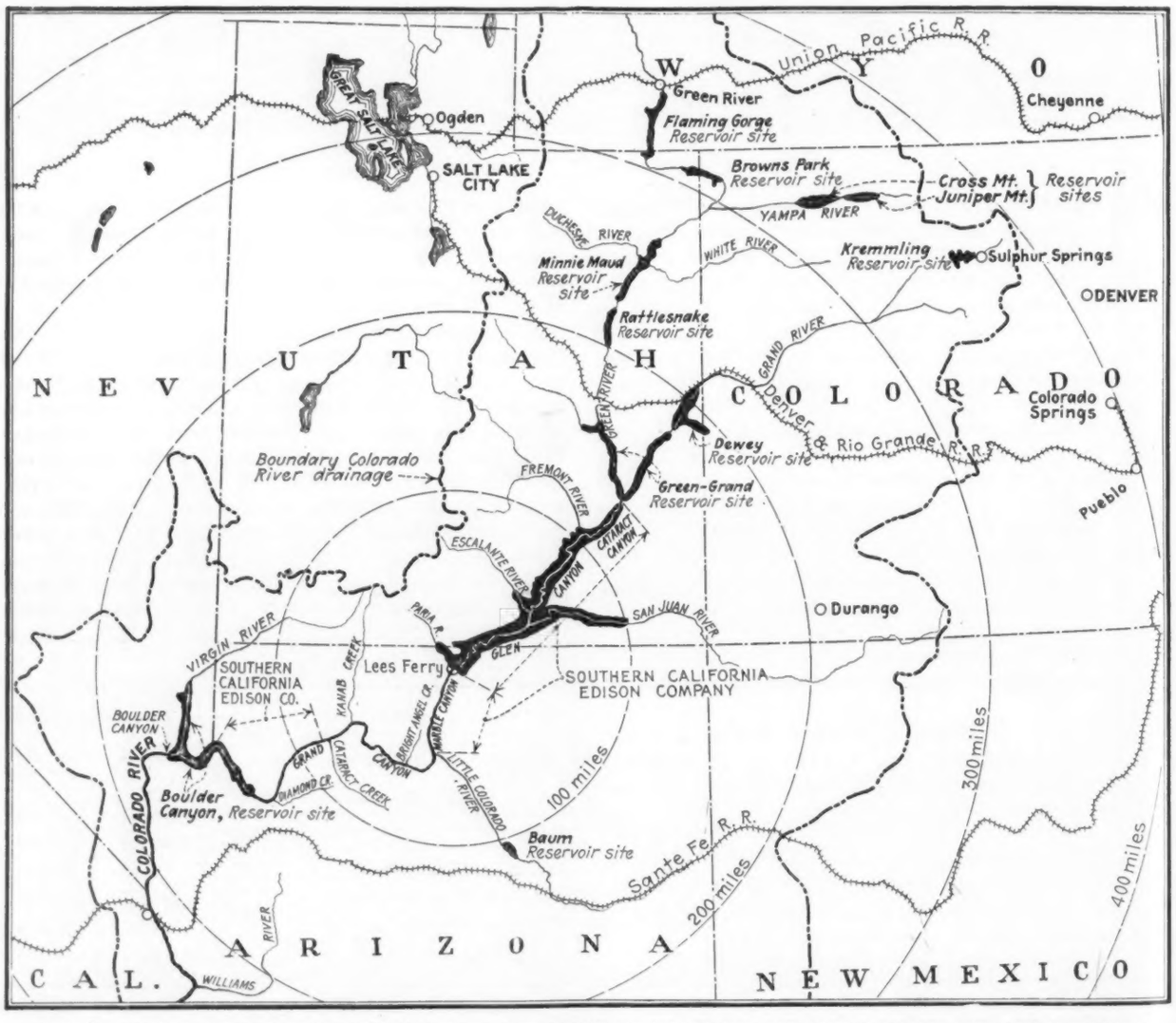


FIG. 2 — POWER SITES ON THE COLORADO RIVER ARE WITHIN TRANSMISSION DISTANCE OF MANY LARGE LOAD CENTERS

Reservoir and the High Line Canal from Laguna dam to the Imperial Valley, in proportion to the interests of the public lands and the Indian lands as set forth in the report.

2. That the Secretary of the Interior be authorized to enter immediately into contracts with such states, counties, municipalities and other interests as may desire to participate in the benefits of the construction herein recommended, provided that each participating agency furnish funds with which to defray its proportionate share of the expense, as allocated by a board to be appointed.

3. That there be appointed a board of three competent persons who shall not be resident in any of the states affected by the decisions of the board and who shall have no financial interest in those decisions, one being an irrigation engineer, one a power engineer and one learned in irrigation law, to allocate the cost and benefits of the proposed construction and assess the cost upon those receiving the benefits in proportion to such benefits. The decisions of this board should supersede the preliminary allocation recommended in this report, and contract should be entered into with all participating parties to abide by the decisions of this board and to supply funds for construction in proportion to benefits as determined by the board.

4. That the Secretary of the Interior be authorized to proceed with the work of development as rapidly as the funds are made available from any of the sources provided.

The report embraces the quantity and regularity of water supply for irrigation, data pertaining to flood control, data concerning storage facilities, and information as to the amount of land available for irrigation and the canal systems which will be required.

The opinion is expressed in the report that the investigations at Boulder Canyon have shown the feasibility of a high dam at that point. The amount of storage which would be furnished by this dam has been computed at contour elevations ranging from 750 ft. to 1,300 ft. (228 m. to 396 m.), showing that the capacity would range from 58,750 acre-feet to 31,600,000 acre-feet (7,050 hectare-meters to 3,792,000 hectare-meters). The canyon walls extend to the 2,000-ft. (600-m.) contour, or 700 ft. (210 m.) higher than the contour which would result in a capacity of 31,600,000 acre-feet.

Whatever action Congress may take in the matter will materially influence future power development on the Colorado River. The supply of additional water for the irrigation of other lands lying below and adjacent to the Colorado River is inseparably bound up with the supply of water to the Imperial Valley and has a direct bearing upon the possible power developments along the river and their location, particularly in point of time as regards the order in which the developments may be made.

The mean annual discharge of the river measured at Yuma, Ariz., of 16,400,000 sec.-ft. (4,100,000 cu.m. per sec.) would be amply sufficient to meet all of the requirements for irrigation. Inasmuch as the discharge of the river varies materially from wet to dry years, storage reservoirs having a capacity considerably in excess of this will be required. A large number of possible and ultimate reservoir sites have been found on the Grand and Green Rivers, as well as on the main stream of the Colorado. The estimates of the capacities of these proposed reservoirs made by various authorities are shown in Table II. The feasibility of the sites and their relative desirability have been the subject of considerable conjecture and dispute and will probably necessitate an act of Congress definitely to determine upon the order of their development.

The Boulder Canyon dam site has been investigated in detail under the authority of the Kincaid act, and a computation of the capacity of this reservoir is shown in Table III. A height of dam approximating 500 ft. (150 m.) has been considered as sufficient to regulate the flow of the river below this site to provide the necessary water for the irrigation of the present and ultimate irrigable areas. The city of Los Angeles, which owns and operates two hydro-electric generating stations on the Los Angeles aqueduct and a distribution system in the city, is making plans to develop the Boulder Canyon dam site in conjunction with the government and other municipalities having irrigation districts with the expectation of having allotted to it a considerable block of power from the generating stations which it is proposed to construct at the base of the dam.

MARBLE CANYON WALLS ARE 3,500 FT. HIGH AT THIS SITE

The Southern California Edison Company has proposed a 500-ft. (150-m.) dam near Lee's Ferry, which is just south of the Utah state line, as indicated in the map. This dam would impound over 40,000,000 acre-ft. (49,200,000 hectare-meters) of water. Various arguments have been advanced both for and against each of these proposed reservoirs, which will undoubtedly be among the first to be constructed on the river. The proponents of the Lee's Ferry reservoir claim that the

JUST BELOW ONE OF THE BOULDER CANYON DAM SITES

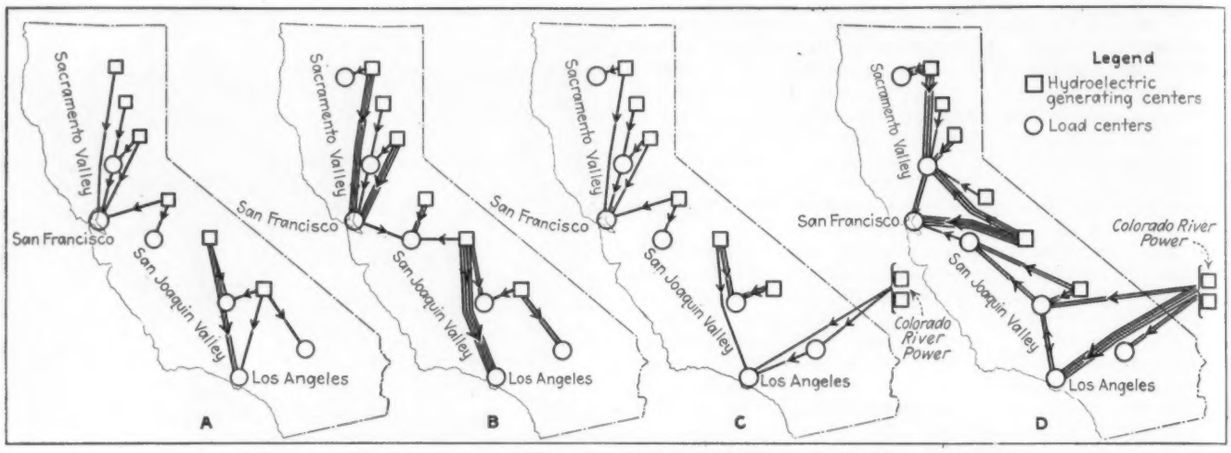


FIG. 3 — EFFECT OF COLORADO RIVER POWER ON CALIFORNIA TRANSMISSION SYSTEMS

A—At present the hydro-electric power generated in California is transmitted in the southerly direction. B—With increasing loads more and more power must be transferred toward the south. C—The introduction of the first block of Colorado River power will affect the southern part of the state only. D—With large developments on the Colorado River the entire transmission system will be turned around to transmit power from the south to the north.

impounding of a large volume of water at an elevation of over 3,000 ft. (900 m.) and above the section of the river wherein the greatest amount of power is available will not only control the floodwaters of the river but also will permit with the greatest advantage later power developments further downstream. Opposed to this is the argument that a reservoir 640 miles (1,029 km.) along the stream from the point of greatest diversion would be too far distant to permit of exact regulation of the water to provide for the fluctuating need for irrigation. It has also been claimed that some 2,000,000 acre-ft. (2,460,000 hectare-meters) of water per annum would be lost should the Lee's Ferry reservoir be constructed rather than the one in Boulder Canyon. The advocates of the Boulder Canyon reservoir site claim that the construction of a dam at this location would regulate the river sufficiently to meet the needs for irrigation and dwell upon the further advantage that the proposed power house would be 150 miles (240 km.) nearer Los Angeles, which is at present the nearest available market.

Although the need for additional hydro-electric power in this section of the country is not so urgent as the problem of controlling the floodwaters of the Colorado River, the time will come within the next decade when this need will be paramount to any other requirement.

The visible market for the power to be developed on the Colorado River is in California. The growth of the load in California from 1910 to 1921 is shown in Fig. 5. During that time the annual output of the fifteen principal power companies of California, which included virtually all of the output in that state, increased from 1,208,000,000 kw.-hr. to 4,386,000,000 kw.-hr. During the last few years the rate of increase has been approximately 10 per cent per annum. If this curve is extended at a rate of increase of 10 per cent per annum, it will be seen that in 1935 the load will have increased to 17,515,000,000 kw.-hr., which is the output of 4,000,000 kw. installed capacity at 50.5 per cent of the maximum possible output. This ratio of 50.5 per cent is that which held for the year 1920.

It is, of course, hazardous to extend a curve of this nature over such a long period in the future. The attending circumstances, however, indicate that such a growth of the load in California is not unreasonable when the rapid increase in the population is considered and proper weight is given to the undeveloped resources of the state. During the decade from 1910 to 1920 the population in California increased approximately 44 per cent while the output of the power companies increased 200 per cent.

In California there are large areas of agricultural

TABLE II—RESERVOIR AND POWER SITES AND CALCULATED POWER AVAILABLE; NOT DEVELOPED AT PRESENT

Reservoir and Power Sites	Stream	Height of Water Above River, Ft.	Reservoir			Power Development	
			Capacity, Acre-Ft.	Estimated Cost	Date of Estimate	Head, Ft.	Kilowatts
Flaming Gorge	Green River	225	3,500,000	$15,991,000	1920	290	53,000
Juniper	Yampa River	200	1,500,000	6,200,000	1920	150 to 240	27,000 to 43,000 hp.
Dewey	Grand River	215	2,270,000	11,160,000	1920	.....	.....
Brown's Park	Green River	150	2,000,000	.....	1916	150	27,000
Cross Mountain Canyon	Yampa River	...	.....	.....	1916	224	13,000
Blue Mountain Canyon	Yampa River	...	.....	.....	1916	400	30,000
Split Mountain Canyon	Green River	...	.....	.....	1916	80	28,000
Ashley Creek	Ashley Creek	...	.....	.....	1916	2,600	14,000
Duchesne River	Duchesne River	...	.....	.....	1916	450	3,100
Minnie Maud	Green River	200	4,000,000	.....	1916	120	48,000
Rattlesnake	Green River	175	.....	.....	1916	165	70,000
Coal Creek	Green River	160	.....	.....	1916	160	43,000
Gore Canyon	Grand River	...	.....	.....	1916	411	45,000
Westwater	Grand River	140	.....	.....	1916	135	9,000
Glen Canyon	Colorado	500	40,000,000	.....	1921	450	600,000 hp.
Upper Grand Canyon	Colorado	...	.....	.....	1921	450	600,000 hp.
Lower Grand Canyon*	Colorado	...	.....	.....	1921	850	1,200,000 hp.
Boulder Canyon	Colorado	500	18,700,000	.....	1920	320	600,000 hp.
Pyramid Canyon	Colorado	...	.....	.....	.....	.....	600,000 hp.
Site Above Parker	.....	...	.....	.....	.....	.....	200,000 hp.

* If Boulder Canyon is developed Lower Grand Canyon will develop only 600,000 hp.

lands susceptible of development by pumped water which are yet untouched. This feature, combined with the growing importance of the industrial load, which is influenced by the possibilities of Oriental trade, leads to the conclusion that the next decade will see in California an increase in the load approximating 10 per cent per annum. On this basis the estimated commercially feasible hydro-electric possibilities of that state will be exhausted between 1935 and 1940. For these reasons, and because of the present necessity of transmitting large blocks of power from the northern portions of the state to the southern, as noted above, the influx of power from the Colorado River will be an economic necessity. Furthermore, the time element is important as several years will be required in which to make available in California power generated on the Colorado River.

Other markets for Colorado River power lie in southern Nevada, where there are large quantities of minerals which might be exploited provided there were an ample supply of sufficiently cheap power available near by. In Utah and in Arizona there are also available markets for power which will be materially increased by the cultivation of the large areas now awaiting the control of the Colorado River.

With the passage of the federal water-power act a number of filings for power on the Colorado River were made. These are as shown in Table I. Principal among these filings are those of the Southern California Edison Company, which total 3,570,000 hp. and which are grouped in the Diamond Creek, Marble Canyon and Glen Canyon units. The relation of these is shown in the accompanying profile and map of the river.

TABLE III—COMPUTED CAPACITY OF BOULDER CANYON RESERVOIR

Contour Elevation	Area (Acres)	Capacity, (Acre, Ft.)	Contour Elevation, (Ft.)	Area, (Acres)	Capacity, (Acre-Ft.)
700	.....	.....	1,050	53,160	7,130,500
750	2,350	58,750	1,100	67,740	10,153,000
800	7,950	316,250	1,150	84,110	13,949,250
850	15,260	846,500	1,200	105,100	18,679,500
900	21,600	1,818,500	1,250	127,660	24,498,500
950	29,160	3,088,000	1,260	131,000	26,000,000
1,000	39,690	4,609,250	1,280	142,000	28,400,000

Various estimates of the developed and potential water power of the State of California have been made by the government and other bodies and place the maximum potential water power of the state at 9,250,000 hp. The latest estimates made by the California power companies place the commercial maximum development at 4,000,000 hp. This figure is based on the expected cost of development within the next fifteen years and may be increased or decreased as conditions change. Water-power filings on California streams aggregating 3,513,930 hp. have been made and give an indication of the accuracy of the estimate of 4,000,000 hp. Up to date 1,107,000 hp. of hydro-electric power has been developed in that state in 130 stations. The growth of the power load in California will be the determining factor as to when and in what quantities power will be required from the Colorado River. It will be seen from the tables and curves of the California load that the commercial maximum development will not be reached before the first power from the Colorado River will be needed. This arises from the economic consideration involved in the transmission of power within California due to the fact that at present the hydro-electric power generated in California is all transmitted in a generally southerly direction. This particular point is brought out in the maps which appear on page 966 and indicate the general direction of transmission under different conditions.

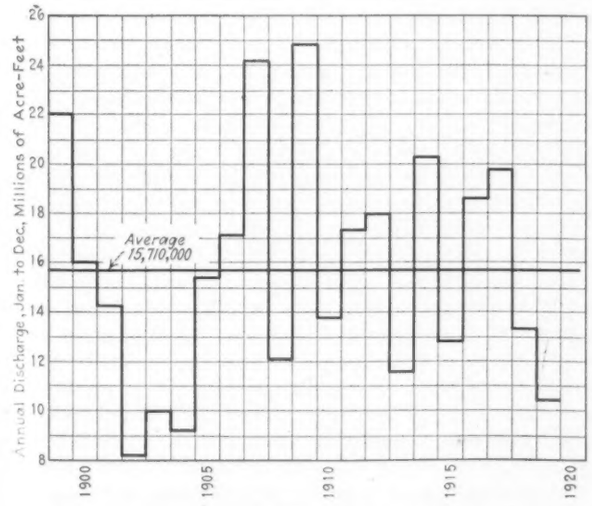


FIG. 4 — ESTIMATED DISCHARGE OF COLORADO RIVER AT LAGUNA DAM

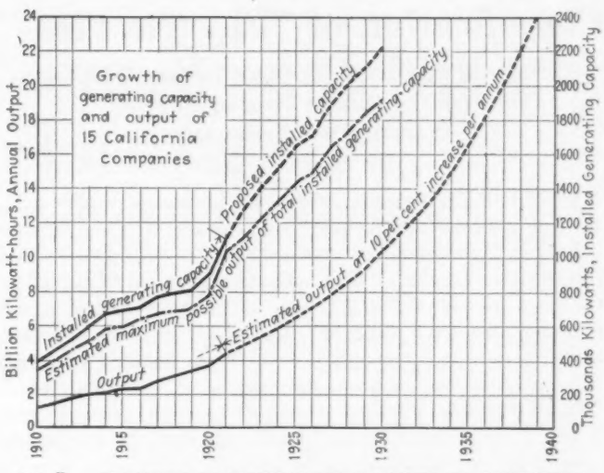


FIG. 5 — RELATION OF GENERATING CAPACITY IN CALIFORNIA TO ANNUAL OUTPUT

Based on past and estimated figures that could be expected in case the commercially feasible projects in that state are developed within the next fifteen years.

Inasmuch as the power available in the northern portion of the state will not in future periods be sufficient to meet the demands of that territory, it will become necessary to transmit power from the south to the north, particularly to the San Francisco Bay district and to Sacramento Valley and still further north.

Therefore it would not be economically sound to construct sufficient transmission lines to transmit all of the required power from the north to the south; rather would it be desirable to bring into the southern part of the state additional power from the Colorado River, thus relieving the necessity of transmitting large blocks of power from the central part of the state to southern California.

The power released in central California by the introduction of Colorado River power into southern California can then be transmitted north to the northern portions of the San Joaquin Valley, the San Francisco Bay district and to the Sacramento Valley. This point also is illustrated.

Classification of "Electric Fires"

A Practical Suggestion Looking Toward Protection from the Present Popular Habit of Blaming Fires on Electricity

By "Kassandra"

PUBLISHED reports of fire departments, underwriting bureaus and so on often contain a classification "electric fires," but on inspection it is found that this classification includes such origins as these: "Lightning struck a hay stack," "A trolley wire broke in the street and set fire to a wagon," "An electric iron was left alive on a suit of clothes," "A spark of static electricity set fire to gasoline in a dry-cleansing establishment," "Street-railway current entered a house over a gas pipe," and, perhaps, even "A cigar lighted at an electric cigar lighter started the fire."

It is true, of course, that electricity is concerned or at least mentioned in all of these. Moreover, a statistician should be left free to classify and analyze his data in any way that he sees fit, since it is only by leaving him free that we shall in the end get the best results. The object of the classification and analysis of fires, however, is to learn the causes so that steps may be taken to improve conditions, and the inclusion of all fires in which electricity is concerned, however remotely, under the general classification of "electric fires" does not help to determine the causes. Furthermore, the object is to reduce the total fire loss rather than the electric loss alone, and it can be shown that if electricity should be entirely done away with, while there would be no electric fires, the total fire loss would be far greater than now.

Present Classification Misleading

The publication of figures showing a large "electric" fire loss from such causes as lightning, static electricity and stray railway current, therefore, does serious harm not only to the electrical industry but to the public. For such figures lead people to believe that electricity is a fire producer, while the reverse is the truth, and the use of electric light and power, even if these do occasionally cause fires, yet on the whole reduces the loss rather than increases it.

It is not fair, however, to criticise the statistician without offering constructive suggestions. One is, of course, that electric fires should include only fires connected with the ordinary supply of electricity for light, power and heat. They should not include fires due to lightning, static electricity, street-railway current or similar remote causes; or at least, if for historical reasons or otherwise it is desired to use a main heading "electric fires" to include all cases when the word "electric" occurs, then the true electric fires due to the electricity used for light, heat and power should be separated from the other so-called electric fires due to lightning, static electricity and so forth.

Among the fires where the wires for electric light and power are concerned there is very important subclassification in which the question arises whether the electric service itself is the cause or whether the electric wiring is merely incidental. For instance, if street-railway current enters a house over the grounded neutral of the electric wiring or over the conduit in which it is inclosed, this might be called a fire in which the electric wiring was involved. But street-railway current also enters over gas, water or steam pipes. Hence, even if all the cases in which the electric light wiring is concerned are put together, these should still be divided into classes to show whether it was the electric light and power current itself that caused the trouble or whether it was street-railway current or lightning or static electricity which happened to use the electric light wiring but might just as well have used the water pipes or gas pipes or telephone wires.

Another sub-classification which would lead to good results would be one that recognized that incendiary fires are quite a different thing from accidental fires. The application of this is particularly to electric flatiron fires, which should really be classified as incendiary, even though obviously non-criminal. For there is no difference in principle between lighting a match or cigar and leaving it where it will start a fire and turning the current on an electric flatiron and leaving the appliance where the same result will ensue.

How to Reduce "Carelessness" Fires

Electric flatiron fires are not really electric fires, but are fires due to carelessness. This leads to a suggestion whereby these fires can be reduced. If an insured person intentionally burns up a suit of clothes, he should not be allowed to collect insurance. If the insurance companies would refuse to pay the direct loss due to leaving flatirons alive on combustible material, the user would be no less careful than now and in time would become far more careful. By direct loss is meant the loss due to the burning or scorching of the clothes or table on which the iron is left.

If a fire thus started were in time to set a bigger fire and, perhaps, burn the house down, then the insurance company would probably feel obligated to pay for the damage to the house, as it does now. To refuse, however, to pay the small direct loss would be a saving not only to the insurance companies but also, on the whole, to the insured. Then the man or woman who now is able to collect the full replacement value of a dress or suit that has gone out of fashion would be a little worse off than at present, but this would not be serious. Such persons, and in fact every insured person, can stand small occasional losses. Against this would be set the resulting reduction in the annual premiums. This would help a little even the careless people who have occasional small losses, while the careful people would have annually a real net saving in the cost of their insurance.

The insurance premium on an electrically wired house is today so low that it is doubtful if the insurance company would want to complicate the policies by offering a differential, but if some insurance company would boldly take the stand that it would not pay the *direct* losses due to flatiron fires—that is, would not pay for the clothes or table that was burned, but would only pay the loss if a big fire occurred—then that company could reduce its rates and get the business in fair competition.

This is, however, merely a constructive suggestion to insurance companies. The immediate point at issue is that a fire due to the careless leaving of electric irons in circuit is a "carelessness" fire, in an entirely different class from a fire due to electricity itself, and that such fires should be separately classified and not called electric. Eventually such a practice would undoubtedly protect the industry from the present popular habit of blaming on "electric wires" every fire that has the slightest connection with electricity or that cannot be attributed to anything else.

Network in Pennsylvania Would Greatly Benefit Industries

Transmission Lines Connecting Steam Plants and Hydro-Electric Plants that Could Be Developed in or Adjacent to that State Would Be of Utmost Value—Use of Power Growing Three Times as Fast as Population

ALTHOUGH bridges, highways, steel mills, railroad tracks, mining operations and highly developed farms hinder the damming of nearly all the important rivers in Pennsylvania, many sites in that state could be still developed through the exercise of a little ingenuity. This is the substance of some remarks made by H. W. Buck in a recent address,* these observations leading up to a consideration of the importance of power development to Pennsylvania. He went on to say:

"Among the prominent streams of the state where there are large potential power sites are the Delaware, Susquehanna, Juniata, Youghiogheny, Lehigh and Clarion. Notable among these are the proposed sites on the Clarion River. This river valley, although comparatively large, is almost free from railroad and industrial development so that high dams and large storage are possible. Much of the power of the state, however, will be found in numerous small streams and creeks of small drainage area with large storage possibilities and comparatively high head. In the aggregate such sites will represent a large part of the power of the state, and they are less obstructed by industrial construction than the larger rivers.

"Since industry cannot stop during the low-flow season in the rivers, steam auxiliary power must be used as a necessary part of any water-power development in order to make the energy from the water powers available during the entire year. In a combination steam and water-power plant, while the steam capacity must usually be about 80 per cent of the water-power plant in order to carry over the low-water season, the actual energy produced in an average year will not exceed from 10 per cent to 25 per cent of the annual total. The cost of power per year from the combination will be found to be less than steam power alone. Water power alone cannot be considered on account of the shortage in the low-water season. In some parts of the state situations may be found where water storage can take the place of the supplementary steam power, but this requires cheap overflow land, which is not abundant in Pennsylvania.

CONSPICUOUS EXAMPLE OF ADVANTAGE OF COMBINING DEVELOPMENTS

"A conspicuous example of the satisfactory results from the combination of steam and water power can be seen in the great plant at Holtwood, on the Susquehanna River, transmitting power to Lancaster and Baltimore. The great amount of hydraulic energy annually available from the Holtwood plant results from the combination with steam power at Baltimore. Without that combination the water power would not be economically possible.

"Pennsylvania is a great coal-producing state, and developments which might tend to reduce the consumption of coal by substitution of water power might not be regarded with popularity. Such a view, however, is not for the best interests of the state. Every ton of coal consumed for the production of power which might have been produced by water power is wasted. There are many uses for coal other than for power which are highly important to the future industry of the state and which cannot be replaced by water power. Where coal is used for power purposes only about 15 per cent of its heat value is utilized. Where it is used for the numerous heating and smelting processes and in the manufacture of gas and byproducts more than 75 per cent of its value is utilized. It is also of importance to the state that coal be conserved for the production of coke.

NETWORK WOULD RELEASE COAL FOR OTHER PURPOSES

"If all of the feasible water powers of the state were developed, they might amount to 500,000 hp. and possibly more. By applying such hydraulic power in substitution for coal, more than 5,000,000 tons of coal would be released annually for purposes of more value to the state as a whole than for power.

"In addition to the water powers of the state there are, of course, others in adjacent states which, if developed, would undoubtedly have part of their output transmitted into Pennsylvania. Notable among these is the power of Niagara Falls. The northwestern boundary of the state is only about 100 miles south of Niagara, which is within easy transmission distance. If legislation some day extends the use of the waters of Niagara for power purposes, this power will have a far-reaching effect upon the industrial development of that section of the state lying around Pittsburgh, Bradford and Erie.

"The very small hydro-electric power plant as an isolated enterprise is not an economic success as a rule. The cost per kilowatt of the transmission lines usually necessary to reach the market is excessive. If the small water powers of the state are to be utilized, there should be a general transmission network throughout the state into which all of the water powers can deliver their energy. In this way the cost of line per plant is very much reduced. Since the State of Pennsylvania is only 300 miles long and 150 miles in width, such a network would be quite within practicable limits. Such a network of transmission lines should be interconnected with all existing steam plants and with others to be built near the coal mines and at points where good condensing water is available. There is nothing new in such an arrangement, and many sections of the country are already supplied with power from a general system in this way. It enables the steam and water power to

*Presented before the Pennsylvania State Chamber of Commerce at Harrisburg.

work together to the best advantage with the maximum saving in coal.

"The question of power in the country or in any state will be of constantly increasing importance as time goes on. The following figures indicate the increase in power used for manufacturing purposes in the United States during the past fifty years:

Year	1870	1880	1890	1900	1905	1915
Population.	38,558,371	50,155,783	63,09,756	76,303,387	82,574,195	102,000,000
Power used, hp.....	2,346,142	3,410,837	5,954,655	10,409,625	14,641,544	22,547,500

"It will be seen from this that the use of power grows more than three times as fast as the increase in population. If the same rate of increase holds for another ten-year period, there must be provided in the United States an increase of power-generating capacity of about 15,000,000 hp. The above figures do not include steam-railroad locomotives. If extensive electrification of steam railroads takes place, the figures will be greatly increased.

"Another table reproduced here indicates the increase in power used per employee in various classes of industry between the years 1870 and 1915. Other available figures would undoubtedly show this tendency still more clearly. A careful interpretation of these figures will

HORSEPOWER PER EMPLOYEE IN SELECTED INDUSTRIES

Industry	1870	1880	1890	1900	1905	1915
Boots and shoes.....	0.01	0.1	0.2	0.4	0.4	0.53
Cotton goods.....	1.1	1.5	2.1	2.7	3.3	4.10
Flour mills.....	9.9	13.2	15.9	20.9	19.9	21.44
Iron and steel.....	2.2	2.8	5.0	7.5	11.2	14.10
Paper and pulp.....	3.0	4.8	9.6	15.4	17.0	23.50
Woolen goods	1.1	1.2	1.6	2.0	2.3	2.41

show what is coming in the future in the relation of power to human production. If wages are to stay up or to advance still further, then there must be an offset by increasing production per man. This will be brought about in the last analysis by giving each man more power to work with. This increased power should as far as possible come from water-power developments. Additional steam power will not have the same advantage, for that will require more men in the coal mines and the loss of their labor plus the loss of the valuable coal consumed.

"There has been considerable hostility in some directions in the past toward water-power development. It has resulted largely from the false popular belief that water running down hill represents power which should be free for all. Such an idea is, of course, as absurd as would be the notion that the ownership of a coal mine represents free steam power. A vast amount of capital and operating expense is involved in water-power development as in other forms of industry. Everything possible should be done to encourage the development of water power as it is for the best interest of the state. If there is to be restrictive legislation, federal or state, and intolerant commission control, conditions will become too burdensome and capital will seek other forms of investment.

"The next wave of expansion which takes place in this country, and all hope and believe that it is close at hand, will probably see great activity in hydroelectric construction. It is to be hoped that the great State of Pennsylvania will play an important part in this fundamental branch of industrial development."

National Economy Dependent on Using More Power per Wage Earner

SUPPLEMENTING man power with more machine power was pointed to by Henry Flood, Jr., formerly secretary of the Superpower Survey, in an address made by him at Newburgh, N. Y., recently, as one method for meeting foreign competition. Mr. Flood said:

"To keep our factories operating at full time it is necessary for us to sell their excess production over our own requirements in the markets of the world and to meet the competition of other industrial nations in that field. We are Europe's creditor to the extent of nearly $15,000,000,000. Our manufacturing industries have developed to the point where we must look beyond our domestic markets to keep them busy. Our nation has changed from one in which the majority of the people are engaged in agricultural pursuits to one where they are dependent on our factories for prosperity. Our resources have been fairly well developed, and we cannot now take a large influx of emigrant labor.

"Europe's debt to this country in government loans and commercial paper stands today at about $15,000,000,000. She cannot liquidate this debt, or even pay interest on it, with gold, for today we own the greatest part of the gold available, while her gold reserves are at low tide. She must pay us with goods imported to this country in the same manner that we met our obligations to her by export in the years preceding the World War. In this the low exchange rate resulting from the war becomes an advantage. So, in order to keep our factories running at full production, we must not only be able to meet this competition in the world's market, but must compete with it within our own domestic market. This is the situation that calls for a program of national economy.

"While in the past we have not had to compete with foreign products in the sense we now do, we have been successful in such competition by our ingenuity in supplementing the expensive man power with cheap machine power, and that principle will furnish one answer to our present difficulties. There is a direct relation between the amount of machine power used per wage earner and the value of products which he produces. In 1899 we were using 2.1 hp. per wage earner, with a resulting value of products of $2,400. By 1914 we had increased the amount of machine power supplementing our man power to 3.2 hp. per wage earner, and the value of products had correspondingly increased to $3,400.

"Of all the European countries England leads in the use of power as an adjunct to labor. In 1907, the year of the last industrial census for Great Britain, that country was using 1.5 hp. per wage earner against our 2.7 and the value of her products was only $1,200 per wage earner as against our $2,950. Thus, while using 18 times more power per wage earner than England was doing, we were producing products 2.4 times the value of her products.

"So, if we are to progress and participate in our share of the world's market, we must place ourselves in the position of being able to compete with European labor by increasing the amount of power that we give each wage earner to supplement his own efforts, and we must not stop at any figure of 3 hp. or 4 hp., but must carry it high enough to wipe out the difference in the labor wage paid here and abroad."

Improved Practices in Exterior and Interior Illumination

Broadening Applications of Modern Equipment Yielding Greater Service to Industry and Homes—Continued High Efficiency in Equipment Sought—Lighting for Night Sports, Public Buildings, Factories and Theaters

NO STARTLING developments in exterior or interior illumination have been made in the past year, but progress has been noticed in the more serious consideration of lighting fundamentals and the more general recognition of the relation between lighting and the efficiency of human operations. In the report which the committee on progress presented recently before the Illuminating Engineering Society, attention was directed chiefly to lighting for night sports, floodlighting, illumination of hotels and public building interiors, factory and laundry illumination, street lighting and theater illumination. Features of that report are given below.

GAS-FILLED LAMPS AND LUMINOUS ARCS COMPETE IN STREET LIGHTING

Street-lighting development in America has begun again to forge ahead, although lack of funds has retarded it in some cases. The committee favors the preparation by the society of a standardized model data form for street-lighting information. The trend of opinion is that street-lighting development should form a part of the architectural progress of every community. There is also a tendency now toward single lamps with prismatic reflectors and toward higher mounting heights. Typical present practice uses heights of 12 ft. to 14 ft. (3.7 m. to 4.3 m.), though heights of 25 ft. to 35 ft. (7.6 m. to 10.7 m.) are used somewhat. Electric street-traffic signals are growing in use.

Noteworthy developments in street lighting are under way or planned for early realization in the Middle and Far West. In San Francisco improvements have come to a standstill, largely owing to the increased cost of lighting through surcharges approved by the California Railroad Commission. In Los Angeles small ornamental post installations have been made. At Salt Lake City 112 new "White Way" standards are to be provided, using 6.6-amp. ornamental luminous-arc lamps, installed three per standard, fourteen standards per block, seven on either side of the street and covering 2 miles (3.2 km.) of streets. There will be about 90 cp. per foot of street lighted. On the Williams Highway, near Denver, 150 600 cp. series incandescents will be mounted on 20-ft. (6.1-m.) posts, the lamp centers being 18 ft. (5.5 m.) from the ground and serving a 5-mile (8-km.) stretch.

In Kansas City, Mo., 5,600 gas lamps are to be replaced by 2,600 electric lamps of the 600-cp. size downtown and 400-cp. in outlying parts. Here the "white-way" lighting is to go upon the regular street-lamp schedule of operation. At Fort Worth, Tex., 800 300-watt lamps will be installed, increasing the system 75 per cent, and Oklahoma City, Okla., has installed a "white-way" system. Since June, 1920, in Detroit, 442 inclosed arcs have been replaced by 4-amp. luminous arcs of the pendant type, and 1,107 new lamps have been installed also. Forty-seven 4-amp. boulevard-type lamps have been placed in Roosevelt Park, and in the ensuing year it is expected that 1,260 4-amp. luminous-arc lamps will be installing in this city.

INTERCHANGEABILITY ACHIEVED

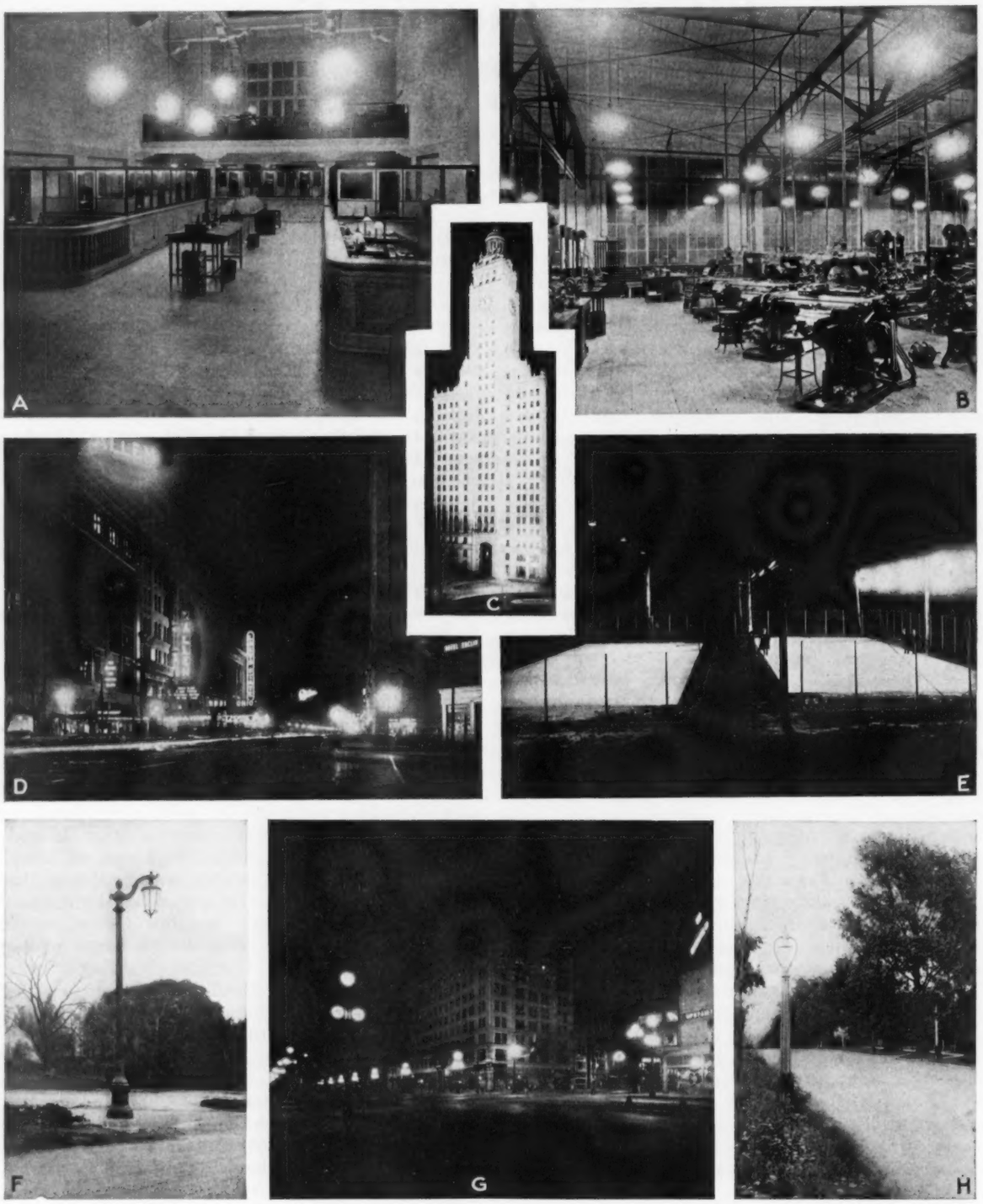
Four hundred more "white-way" lamps are scheduled for Cleveland in the coming year, and recently 600-cp. tungsten lamps spaced 200 ft. (60 m.) apart, with lamps 20.5 ft. (6.2 m.) high, have replaced for park lighting 250 cp. gas-filled lamps 250 ft. (75 m.) apart and 9 ft. (2.7 ft.) high. The globes are of the "white-way" type used in the same city and, with parts of the standards, are interchangeable. At Hamilton, Ohio, 1,400 gas-filled tungsten lamps ranging from 1,000 cp. to 250 cp. will replace series inclosed arcs, now obsolete, and at Lima, Ohio, 1,000 lamps of 1,000 cp. are going into a new system. Two hundred "globeless" standards have been installed at Rochester, N. Y., and Montreal West is to be lighted by 280 tungsten lamps. In the western part of Victoria, B. C., gas-filled tungsten lamps are replacing arcs.

Outside North America, considerable activity is evident. Many places in Cuba are installing electric street lighting. Havana is providing electric lamps on all streets, and 500 arc lamps have been replaced by gas-filled incandescents, utilizing the old hoods as fixtures, with bracket-arm suspension retained. The high cost of fuel has led to the increased adoption of electric street lighting in place of gas, notably in Holland and Italy. In the latter country, high cost of labor and shortage of carbon electrodes have hastened the use of incandescent in place of arc street lighting. Last fall the coal stock at Paris reached a point permitting increased lighting and 1,500 electric lamps were to be installed. In Shanghai, China, the lighting of the main thoroughfare, Nanking Road, has been changed, thirty-five 400-cp. cluster fittings being replaced by seventy-two 600 cp., gas-filled tungsten lamps.

FIXTURES RESPOND TO DEMAND FOR PROGRESS

Several marked advances in fixtures for street lighting have been made. In the so-called globeless standard (see ELECTRICAL WORLD, June 18, 1921, page 1,430) the main feature is the porcelain insulator, which is made flaring and thus serves as a reflector and socket holder. It is designed to redistribute downward the light coming upward from the lamp. Glare is eliminated by using bowl-frosted lamps. A new unit made double and fixed to utilize the light from a single intermediate bulb, to illuminate the road in both directions, is another striking development. Nested reflectors throw a large flux, much of which is ordinarily wasted, upon the road surface. The rays make an angle of 10 deg. below the horizontal, giving the effect of an over-

Extent to Which Illumination Can Be Commercially Applied Depends Largely on How Fully Available Equipment Is Utilized



A—Suitably shielded high-intensity light sources make this banking space cheerful and facilitate accuracy.

B—A high intensity of 21 foot-candles is found desirable in this machine shop, which is lighted by 300-watt gas-filled lamps in R L M domes.

C—Floodlighting makes building architecture as attractive by night as it is by day.

D—Blue-bulb gas-filled sign lamps becoming popular.

E—Side lighting with twenty-four 250-cp. series lamps enables tennis playing on these courts at night.

F—Cleveland parks are lighted by this type of ornamental post holding a 600-cp. lamp.

G—Three-lamp posts illuminate the newly lighted business districts of Salt Lake City.

H—For the residence sections of Rochester, N. Y., no globe is employed in the fixture.

head reflector 15 ft. (4.6 m.) in diameter. The bracket is both vertically and horizontally adjustable. In a test installation 250-cp. lamps were used at a height of 30 ft. (9.1 m.), with 400-ft. to 600-ft. (121.6-m. to 182.4-m.) spacing.

In England fixtures combining mirrors and reflectors are being tried out, using gas-filled lamps. Adjustment is a feature of some of these units, and easy cleaning has been provided for.

Opinions still differ as to the desirability of shadows in tennis-court illumination. Both uniform and non-uniform systems appear satisfactory. At San Francisco installations of four 1,000-watt gas-filled lamps per court in metal reflectors mounted 30 ft. (9 m.) above ground have been made, the lamps being suspended over the center line on steel cables. The shadows caused by the fixed position of the lamps are said to facilitate playing. Interior court lighting has also been adopted to apparent advantage, and a notable Montreal installation equipped with 200-watt and 100-watt gas-filled lamps in rows and with floodlight supplementary illumination gives virtually no shadows, with a range of 10 to 25 foot-candles on a plane 30 in. (0.76 m.) above the floor. In this case the total connected load gives 5.61 watts per square foot of floor area.

Floodlighting of the Executive Capitol at Pretoria, South Africa, marks a pioneer installation in that region. The building, 920 ft. x 200 ft. (187.9 m. x 60.8 m.) is illuminated by thirty-nine projectors equipped with 1,000-watt lamps, and a coloring effect with red glass screens is also provided by a number of 500-watt lamps. At Vancouver, B. C., railway terminal lighting by twelve 1,000-watt lamps in reflectors placed on ornamental standards in front of the building has replaced the former direct-lighting units. An angle reflector with fixed focus and adjustable about 10 deg. is inclosed in a spherical globe of composite nature, the lower half being of copper and the upper half of glass. The standards are 27 ft. (8.2 m.) apart, and the intensity on the building front is 1.5 foot-candles. A novel use of floodlighting is reported in the case of a suburban residence owner who applied it to tree-tops within 100 ft. (30 m.) of his home to keep off blackbirds during certain periods of the year.

ELECTRIC LIGHTING FLEXIBLE AND ATTRACTIVE

Improved lighting of public building interiors received considerable attention in the report. The new Town Hall of New York City has been lighted by 2,500 indirect units, and Independence Hall, Philadelphia, has been equipped with chandeliers duplicating in design those used in 1735, when the building was constructed, frosted bulbs having replaced the original candles. Bracket lamps and pendent bowls are used effectively in the new Sessions House of the London County Council, the glassware of the latter having a transmission factor of about 45 per cent. Tests show 3.8 to 4.2 foot-candles in the court rooms and 4 to 5.1 foot-candles in the hall. In offices and committee rooms the intensity varies from 3.1 to 5.7 foot-candles, and in the prison cells it is 0.89 foot-candle 3 ft. (0.3 m.) above the floor. The famous Church of St. Dunstan's at Canterbury, England, has been equipped with gas-filled lamps in reflectors giving 2 foot-candles to 3 foot-candles at an expenditure of 0.3 watt per square foot of floor area, in place of gas lighting.

Advances in hotel lighting include a considerable use of crystals in the promenade, ball room and dining rooms. Special fixtures have also been designed to meet the requirements of dark finishes in hotel lobbies, a noteworthy installation being made adaptable for either a 200-watt or a 300-watt lamp, with side panels of dense opal glass and a bottom diffusing plate. This installation gave 4.5 foot-candles on a reading plane with an energy consumption of 1 watt per square foot and at the same time does not distract attention from the main attractions of the lobby.

DEPARTMENT-STORE INTENSITIES HIGHER

An increase in the intensity of lighting counters and tables in department stores was recommended after investigation of conditions in twenty-six large establishments. For the first floor it is now recommended that the intensity range from 6 to 10 foot-candles, and from 4 to 8 foot-candles for other floors.

Wide ranges of spacing, heights and make-up of factory lighting units are cited in the report, including both uniform and non-uniform distribution of equipment. In one new machine shop an intensity of 9 foot-candles is attained by the use of 150-watt gas-filled lamps in standard steel reflectors mounted 9 ft. (2.7 m.) above the floor, the units being staggered in rows 7 ft. (2.1 m.) apart and with a spacing of 14 ft. (4.2 m.) between units in each row. From other examples cited illuminations around 3 foot-candles over aisles and 7 foot-candles over lathes and machines were given, and the report quotes special examples of lighting previously described in the ELECTRICAL WORLD (March 19, 1921, page 657; April 16, 1921, page 884; May 7, 1921, page 1054; April 2, 1921, page 768). In a new lighting installation in an English sawmill it was found possible to get an intensity of 6 foot-candles at an expenditure of only 0.7 watt per square foot. The main shop, 66 ft. x 125 ft. (20 m. by 38 m.) is equipped with fifty-eight 100-watt gas-filled lamps with intensive reflectors uniformly spaced and 10 ft. (3 m.) above the floor. In the carpenter shop, with the same type of reflectors and lamps, 6 foot-candles were obtained with only 0.65 watt per square foot.

Additional information on the relation between lighting and factory output is given in a report (Bulletin No. 9) issued last year by the Industrial Fatigue Research Board of Great Britain. This deals with conditions in two mills investigated, with the following conclusions: (1) There is a gradual increase in the output of silk weavers between December and March, due chiefly to the decrease of artificial lighting required; (2) that under artificial illumination production falls off by about 10 per cent of the daylight value of the output. The illumination at the cloth fell in one mill varied from 3 to 3.5 foot-candles and on the porry from 3 to 5 foot-candles. In the other mill each loom was provided with two 30-watt lamps, the control being in the hands of the operators.

EQUIPMENT MEETS SEVERE CONDITIONS

Illumination of laundries is a problem of some difficulty on account of the presence of steam vapor and bleaching chemicals. A recent installation comprised prismatic reflector units of the reflector-refractor type mounted 10 ft. (3 m.) above the floor on 19-ft. (5.8-m.) centers and containing 200-watt gas-filled tungsten lamps in the washing, ironing and pressing departments. In the sorting, marking and packing rooms the same unit with a lamp of small wattage, lower mounting heights and closer spacing was used. After two

months' use the intensity in the washing and drying rooms was found to be 3 foot-candles and in the other departments 5 foot-candles. In the offices, larger units were used and gave 8 foot-candles illumination.

A new system has been developed for railroad engine-house lighting. A special type of reflector is used, and these are mounted in pairs so that the beams of light from each pair are crossed. The units have a cast-iron body with a reflector of glass of which the surface is like that of sheet metal which has been hammered with a ball-peen hammer. This produces many small reflectors and results in a distribution of light rather than glare. It is easily cleaned and is not affected by locomotive smoke. In one installation the units are mounted 10 ft. from the floor, and generally they are 7.5 ft. (2.3 m.) each side of the track center line. The lamps are the 100-watt gas-filled tungsten type. In another house a 13.5 ft. (4.1 m.) height is used.

Advances in the lighting of motion-picture theaters are noted in the more skillful use of cove lighting and in the use of translucent glass ceiling inserts concealing lamps of various colors. Tests show that illumination on the table plane may reach 0.1 to 0.2 foot-candle without interfering with the quality of the projected picture, and that, further, to avoid glare and undue lowering of the adaptation level, the maximum surface brightness that may fall within the field of vision of the observer should not exceed 2.5 to 3 millilamberts. The use of chandelier and dome lighting is also being extended. One of the latest installations has a main auditorium lighted by a sunburst dome 65 ft. (19.5 m.) in diameter, silver-lined and lighted by lavender-colored lamps. All lighting projectors and floodlamps are concealed behind pastel ornaments, the theater having three separate means of illumination.

Floodlamps Displace Footlights

A method of eliminating footlights is reported from Germany, where two large reflectors totally inclosed, with a lens in front of only 15 cm. diameter, are placed high up in the fore part of the stage, one on each side. A dimming arrangement and various colors are provided, and the results are reported to be satisfactory. Reference was also made in the report to the description in the ELECTRICAL WORLD of Oct. 16, 1920, page 777, of the lighting of the auditorium of one of the largest playhouses in the world.

In reflector design for mercantile use the general tendency is to make the units dustproof as far as the interiors are concerned. This simplifies the cleaning problem. Forms of reflectors vary. They include the use of multi-surface housings for lamps and sometimes facilities for concentrating light on a working plane. One sample is made in four sizes and can now be obtained in decorative form for home use. A feature of a new indirect unit which emits only 14 per cent of the lamp output below the horizontal is the use of two inverted bowls, one inside the other, with different optical properties for producing a fading spot on the ceiling. The new unit throws a wide spot shading away with no marked limit even when mounted only 12 in. (0.3 m.) below the ceiling. The outer bowl is translucent and thus avoids a sharp contrast against the ceiling. All glass surfaces exposed to the air are smooth, making cleaning easy, and the space between the two bowls is sealed at the top by a white-enameled diaphragm. Another innovation is the use of silk and other fine-mesh light filters, which may be placed around the inner reflector in the form of an outside cover. Parchment and silk shades may also be used with this unit in lighting the home.

Other units lately designed provide for rearrangement of parts to suit conditions in different locations, and another unit for store and factory lighting is provided with a focusing arrangement for alteration of the light distribution through a considerable range. A semi-indirect commercial unit has a glass globe blown in one piece and enameled on sides and bottom, low intrinsic brilliancy being accompanied by good distribution. The two-piece units, however, still maintain their popularity, and new designs continue to appear, together with units designed for heavy duty amid gases and vapors.

The Ownership and Operation of Utilities

Conclusions of a Committee of National Association of Railway and Utilities Commissioners Resulting from a Study Begun in 1917

AT THE annual convention of the National Association of Railway and Utilities Commissioners in Atlanta, Ga., the committee on public ownership and operation of utilities rendered the following report, resulting from a study of all phases of the subject during the past four years:

In 1917 there was created by the National Association of Railway and Utilities Commissioners a special standing committee known as the committee on public ownership and operation. The report of the first committee made at the thirtieth annual convention of this association, November, 1918, outlined an elaborate program of study of the subject, and the two reports of subsequent committees have dealt with various aspects of the question. The limited space available in this present report precludes the setting out in full of the results of any detailed study of the question and circumscribes this report to a condensed expression on the most salient and important factors involved.

There are, as we see it, only two elemental aspects of the question of public utilities, viz., (1) publicly owned, either with public or private operation, and (2) privately owned and privately operated, either with or without public regulation.

This committee takes the negative view as to the first and the affirmative as to the second, *i.e.*, with public regulation, and sets out its reasons therefor in the following:

Government is instituted among enlightened, civilized peoples in order to insure to the majority of the governed the greatest degree of freedom, liberty and happiness. There is no other sound reason or excuse for the existence of government, if we grant the truth of the principle that all government derives its just powers from the consent of the governed.

This granted, it is then no less true that a sound theory of government would dictate that there should be as little governmental interference with legitimate business activity as is consistent with the protection of the rights and property of the citizens and their enjoyment of life, liberty and the pursuit of happiness.

Building on Accepted Axioms

We take it that these general principles are now but axiomatic. If these be the great basic truths that they are generally and universally conceded to be in this country, then it naturally and logically and inevitably follows, as a necessary conclusion, that the less governmental encroachment there is upon the domain of private business initiative and incentive, consistent with the fair and equitable protection of the rights of the majority of citizens, the more nearly does such government approach the real

functions of sound government as laid down by our forefathers in the basic principles of the creation of our republic. It necessarily and logically further follows that government is then not instituted, as one of the ends of its creation, for the purpose of the ownership and operation of what are essentially and basically private businesses. Public utilities are essentially such, provided the public is given fair and adequate service at a reasonable cost. Public, governmental, regulatory bodies are created for this latter purpose only and can have no other reason for their existence at the expense of the public. However, the safeguarding of these essential rights of the people does make the existence of such bodies a real necessity.

Politics Fatal to Economy

Again, a closer examination of the application of these general principles, we submit, but bears out the conclusion reached. In the ownership and operation of such utilities by government it is practically impossible to exclude the influence of politics. As long as human nature and self-interest is as it is, and before the coming of the dreamed-of Utopia or millennium, the subtle influence of politics would almost inevitably creep in, however ingenious the safeguards that might be thrown around it. Again, with every change of political administration would come a change of business administration of such utilities, with its consequent change of business policy. This would be fatal to their operation under sound principles of economy and business efficiency.

As illustrative of this fact we may be pardoned for calling attention to two late outstanding examples in this country, the government operation of railways and the creation, management and operation of the United States Emergency Fleet Corporation. The first of these is now almost past history, except for the readjustments to private ownership and operation and the liquidation of the staggering operation-loss debt of $1,800,000,000 resulting from the twenty-six months of government operation.

The United States Shipping Board and its subsidiary, the Emergency Fleet Corporation, were created in 1917 as a war measure to provide adequate transportation of troops overseas. Since the signing of the armistice, November, 1918, the fleet corporation has been operated as a business corporation. It has over $3,000,000,000 worth of property. For the first two years after the armistice there was an extraordinary boom in shipping. Yet the statement of its business operations from its inception to June 30, 1920, shows the following astonishing financial results from operations: Revenues received, $817,271,542; expenses, $1,002,396,579; operating loss, $185,125.037.

Yet privately managed British merchant fleets reported during the same period net profits on their investment ranging from 20 to 40 per cent. The latter were privately owned and managed, under certain reasonable government regulations; the former was government owned and operated. The difference in the respective systems of management is responsible for the difference in the results. This, we believe, sufficiently speaks for itself.

Government Ownership of Utilities a Failure

However, it may not be amiss to call attention to a few other cases where government ownership and operation has been in recent years tried. The largest example, carried to its ultimate logical conclusion, is found in the communistic régime in Russia. The plans upon which their theory is based apparently are wholly logical and should work out successfully if only they had a new and different kind of human being to deal with; but, human nature being what it is, such plans will not and do not work out in actual practice. The result of the attempt to put these into actual practice is known to the whole world. Another example is the tramways of Glasgow. They are said to be a model of municipal ownership, and they are, yet the tax rate of Glasgow has steadily risen. The English telephones are owned by the government; they are not self-supporting. The people of this country would not for a moment submit to such service as they give. Our telephone service at its worst is better than theirs at its best, and yet our tolls are lower. Instances of public ownership and operation might further be multiplied. The results are practically all the same. Private ownership and operation under municipal or community regulation has also been tried in this country in many instances. Instances are found, among others, in the States of Washington, Arkansas, North Dakota, etc. However, wherever tried, it has proved a practical failure, with either a resultant increase in rates beyond the reasonable value of the service rendered or the breaking down of the utility in question, with a large proportion of its operation costs borne by taxation.

Business is essentially management—not a plant, nor blueprints, nor rules, but men. Business is the functioning of a highly skilled managing personnel, a buying and selling organization, trade connections, and the intangible but valuable good will, in addition to plant and equipment, and even finances. The latter constitute but the instrument, the former the business. The criterion of successful business is the periodical balance sheet. Government is essentially a political concern; it necessarily thinks and acts politics. Politics is not concerned with the profit or loss showings of balance sheets, but is vitally concerned with political campaign showings. "Passing the buck" in critical situations is necessarily one of politics' favorite pastimes. Basic conditions of politics make it so. Making quick decisions and assuming responsibility is an essential part of the lifeblood of business. The two are uncongenial bedfellows. Again, as above mentioned, changes in political administration necessarily bring about changes in administrative policy. Changes in administrative policy are costly and bring about unsettled business conditions. Continuity in adherence to a sound, tried business policy is an essential to continued successful business operation and the maintenance of the concurrently necessary business good will. This is at least difficult, if not impossible, in the publicly owned and operated public utility. The ultimate conclusion in the last analysis is self-evident to all thinking men, and forces us to discard the publicly owned and operated public utility.

There then remains only the privately owned and operated public utility, either with or without public regulation. All experience has shown, as is generally conceded, that such, without a regulation by a representative body of those who are dependent for service upon such utility, is both unwise, unsound and unfair to the public served. By the process of elimination there then remains only the public utility regulated by an authoritative governmental body in close touch with and sensitive to the needs of the public served.

Utility Rates Should Not Be Hastily Reduced

Such regulatory governmental bodies, however, at the same time must be sufficiently wise and fair and far-seeing to stand between the utility in question and unthinking, hasty public clamor, not based upon full knowledge and careful thought. Public utilities are subject to the same financial laws of operation as are private enterprises. They must operate successfully in order successfully and adequately to fulfill their duty of service to the public, not only in the present, but in the near future. This is peculiarly true at the present time, and for the reason that for the last five years their revenue rates did not proportionately increase with their rapidly increased costs of operations. It therefore follows that, in order to maintain a just, equitable balance and to even keep such utilities out of bankruptcy, it is necessary to maintain their higher rates longer than would to the layman seem necessary, judging by the surrounding decline in commodity prices. To follow any other policy would be to put such utility out of business and to discontinue that service to which the public is so justly entitled and which is now more necessary to the return of the vast bulk of private business to the desired goal of normalcy.

The foregoing considerations force your committee to the conclusion that the present system of private ownership and operation under public regulation is the logical, just, equitable and best system of conducting the business of public utilities that has been or can be devised to meet the needs and requirements of both the utilities in question and the public by them served.

Letters from Our Readers

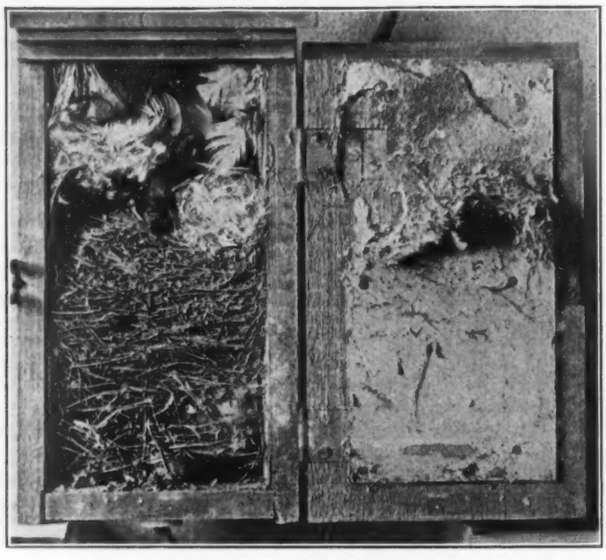
This is a readers' forum. Comments on questions before the electrical industry presenting economic, financial, engineering or commercial aspects and new or supplementary viewpoints on published articles are cordially invited

Multigap Arresters Adopted as Home by Woodpeckers

To the Editors of the ELECTRICAL WORLD:

Instances of multigap lightning arresters being partly destroyed by the nest-building proclivities of birds were discovered recently on the lines of the Kansas City Power & Light Company. Birds' nests are not uncommon in boxes of this sort installed on poles. In this case the holes in the boxes were made by woodpeckers. After drilling the holes in four different boxes they in each instance removed the sheet of asbestos which lined the inside and then completely filled the box with grass and feathers. Fortunately, company linemen on an inspection trip found the nests before fire had an opportunity to destroy evidence, and the boxes have been preserved to demonstrate how far birds can go with their nest building in electrical apparatus and still not be killed.

The explanation of the persistence of the woodpeckers



INTERIOR OF ONE OF THE BOXES COMPLETELY FILLED WITH GRASS AND FEATHERS

in drilling through such thick pieces of wood is that birds of this species "drum" on any hollow wood to call their mates. Lightning arresters have proved particularly attractive to the birds as the accompanying photograph shows. It will be noted that there are only three gaps at the top of the box between the line and ground polarity and that the birds built their homes and deserted them without in any case being electrocuted.

D. D. CLARKE,
Electrical Engineer.
Kansas City (Mo.) Power & Light Company.

The Accident at the Greendale Substation of New England Power Company

To the Editors of the ELECTRICAL WORLD:

There has been considerable misunderstanding in electrical circles regarding the accident in Worcester, Mass., on Sept. 9 which resulted in the death of P. C. Henry of the New England Power Company and H. B. Bush of this firm and the injury of Mr. Armstrong, also of the New England Power Company. We believe, in justice to all concerned, that these misconceptions should be corrected. With that end in view the following report has been prepared giving as accurately as possible the events which led up to the unfortunate occurrence and the results of subsequent investigation.

The demonstration in Worcester was given for the purpose of testing the value of the Bush phase stick as a means of locating defective insulators on 66,000-volt lines. The instrument had been used with entire success in the Middle West on voltages up to and including 33,000 volts, but not on any of the higher voltages.

The test was conducted at the Greendale substation of the New England Power Company. In order that various officials of the company who were present might see the operation of the tool at close range it was decided that a preliminary demonstration should be given on the ground. About eight insulators which had been in service were collected for test.

The demonstrators had with them a Bush hot-wire working outfit, and with this equipment it was possible to arrange a test platform. A safety staging basket (made of treated wood) was inverted and placed on the ground at the rear of the substation. Across this staging was lashed a treated wood beam about 6 ft. long with a metal plate at each end. To one of the metal ends of this beam was connected a length of insulated No. 10 wire, and the other end of the wire was tapped by means of a grounding clamp and treated wood handle to one phase of the line just above the insulator on the framework over the lightning arresters. To the other end of the beam a similar length of wire was lashed, leaving about 2 ft. projecting toward the center of the staging, its end being attached to a treated wood rod about 4 ft. long provided with a bayonet point. The other end of this wire was also run up and tapped to one of the other phases. Before the hot taps were made an insulator with a piece of bare copper wire wrapped beneath the upper bell was placed in the center of the staging for test as shown in the figure.

For the benefit of those not familiar with the construction of the Bush phase stick, the following brief description is given: A current-limiting device in the form of a condenser is mounted near the end of an 8-ft. treated wood handle. The upper terminal of this condenser is connected to the bayonet point of this handle and the lower terminal to a length of flexible cable carried on a spring reel just below the condenser. On the outer end of this cable is a spring snap by means of which the cable can be hooked into an eyelet on a second treated wood handle known as the placement stick. This eyelet is near the upper end of the placement stick and is also connected to a bayonet point. Thus, when the two sticks are attached, the point of the placement stick is connected to the point of the phase stick *through* the condenser on the latter. The condenser is designed with sufficient resistance to allow the phase and placement sticks to be touched to opposite phases on the voltage for which the tool is built. This is done in phasing-out work, a spark gap which may be

opened or closed being provided on the side of the phase stick which gives the indication of similar or dissimilar phases. On insulator-testing work this phase gap is closed. The point of the phase stick is touched to one phase and the point of the placement stick inserted beneath the bell of the insulator to be tested on one of the other phases. A voltage equal to that of the line is thus impressed on the under side of the top unit of the insulator. In the event that there is a defect a stream of sparks will pass through the insulating material to the line above. From the foregoing description it is apparent that the conditions arranged for the test were similar to those actually found on the line except that the insulator under test was energized from below.

Mr. Henry held the phase stick in contact with the left phase. Mr. Bush manipulated the placement stick connected to this phase stick, and the writer held the right phase in contact with the copper wire below the upper unit of the insulator. An apparent flaw was discovered in the first insulator tested. On account of the bright sunlight, however, it was impossible for the observers to see the behavior of the spark, and Mr. Armstrong was stationed to the rear of Mr. Bush and Mr. Henry with a long switch pole on the end of which was a piece of canvas to cast a shadow on the insulator.

After testing the top unit of the first insulator for possibly five minutes Mr. Bush announced that he would move the point of his placement stick over to the edge of the insulator bell and make contact with the copper wire which the writer was energizing from the other side, thus throwing the condenser directly across phases. He proceeded to do this and the condenser on Mr. Henry's stick exploded. Subsequent investigation showed that the flash actually occurred before the point of Mr. Bush's stick touched the wire.

All four men engaged in the test were thrown to the ground. Mr. Armstrong regained consciousness in about ten minutes, having sustained severe burns about the face, arms and side. Mr. Henry attempted to rise to his feet after the explosion but dropped back unconscious. Mr. Bush spoke a few words as he was being carried out of further danger and then became unconscious. The writer was uninjured.

First-aid measures were taken immediately by the New England Power Company's men, who showed a very commendable familiarity with resuscitation methods. Neither Mr. Bush nor Mr. Henry responded to treatment, and they were pronounced dead at the hospital some hours later, after pulmotors had been used.

It is the general opinion among the men who saw the accident that the fatalities were caused by the effect of gases generated by the several arcs formed. This theory would appear to be substantiated by the condition of the bodies. Mr. Bush had what appeared to be a small burn on one of his toes and another even smaller on his right thigh. His hands were slightly blistered as though by the heat of the arc. His shoes were not marked in any way. The writer did not see the other body, but he understands that only minor burns were found. The direction of the disturbance was apparently away from the writer and toward Messrs. Bush, Henry and Armstrong, as is evidenced by the fact that Mr. Armstrong, who was further from the test apparatus than any of us and in no way connected to it, was burned as described above. This was due no doubt to a very slight breeze.

There is no doubt in the minds of any one concerned that the treated wood handles stood up. If the charge had been so received the victims' hands would certainly have been burned electrically, which was not the case, nor were there marks of any kind found on the handles.

In concluding this report we wish to emphasize the fact that the value and safety of the method of working hot lines devised by Mr. Bush and exemplified by the "safety staging" and "safety ladder" are in no way

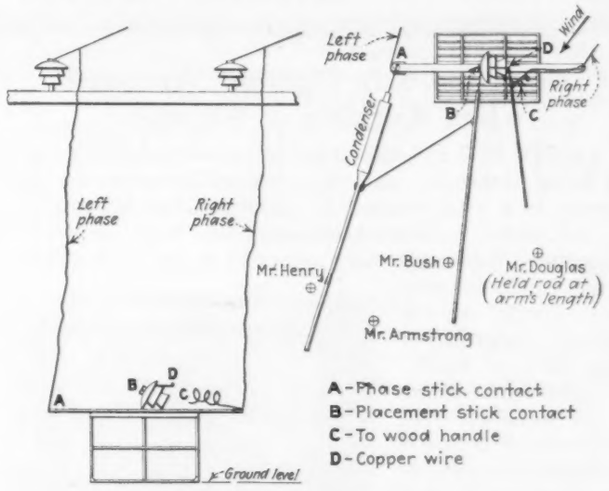


DIAGRAM OF CIRCUITS DURING INSULATOR TESTS

affected by this accident. The demonstration in Worcester was in reality a laboratory test of a tool that in no way involved the Bush principle of putting the protecting insulation between the man and the ground.

The Bush Electric Company, M. D. DOUGLAS.
Cleveland, Ohio.

I have read the foregoing report and find that the facts as given therein are in accordance with my understanding of the accident. C. R. OLIVER,
Assistant General Manager.
New England Power Company,
Worcester, Mass.

Paramount Importance of Good Public Relations

To the Editors of the ELECTRICAL WORLD:

I have read with interest Bert H. Peck's article on "The Public Utility from the Customer's Viewpoint" in the Oct. 15 issue of the ELECTRICAL WORLD.

The one thing we always preach about to our own people is their relations with our customers. Viewed from a merchandising standpoint, our business is not different from any other business, and we try to conduct it in about the same manner that any good merchant conducts his business. The most successful department store is the one where the salesmen and saleswomen are educated in courtesy and good will toward the customers. People do business with stores in a certain way. Then why should a public utility try to teach them any other way?

Mr. Peck is right—public relations matters deserve the best talent that can be afforded in the industry. Our success has been largely due to our efforts along proper lines of merchandising effort. We always welcome constructive complaints and go as far as good business methods permit in carrying out suggestions from our customers, who are our best salesmen.

We have not gone into customer ownership because our stockholders "grab" new issues as soon as offered.

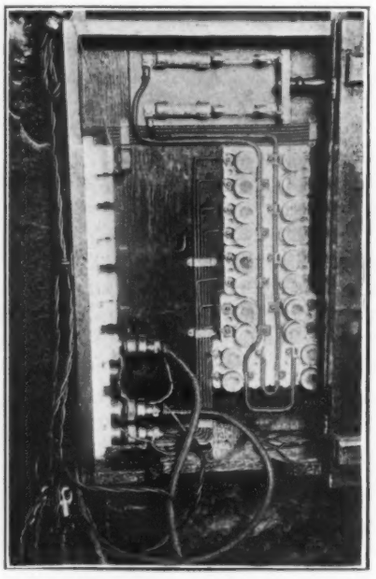
Worcester Electric Light Co., FRED H. SMITH,
Worcester, Mass. Assistant General Manager.

Industrial and Station Practice

Installation, Operation and Maintenance of
Generating and Distribution Equipment and Economical Utilization of Electrical Energy
in Mills and Factories, Including Testing and Repair Methods

Good and Safe Lighting Necessary When Working in Wheel Pit

ADEQUATE and safe illumination of wheel pits during inspection and repair work in hydro-electric plants is a vital element in operation, in the opinion of Alexander E. Bauhan, Pennsylvania Water & Power Company, Baltimore, who presented a paper on "Hazards in Hydro-electric Plants" at the recent congress of the National Safety Council at Boston.



PORTABLE DISTRIBUTION BOX HUNG IN WHEEL PIT WHERE WORK IS BEING DONE

In wheel-pit illumination it is advisable to have portable lighting equipment made up and used when needed in accordance with a predetermined plan. General illumination can best be provided by a few high-powered units with suitable reflectors, particular attention being paid to avoid deep shadows. Provision must be made for an adequate number of portable lights. "In our case," said Mr. Bauhan, "the number of circuits needed is large and a pipe connection through the wall of the pit, normally capped at both ends, is used for leading in a pair of main supply wires. A portable distribution box made up for the purpose, equipped with fuses and receptacles to which the various circuits can be plugged, is hung on supports permanently mounted on the wall of the pit. Whenever any extended work is to be done in the wheel pit electricians install this distribution box and all the necessary lighting equipment before the work is started.

"The duty on the drop cords is particularly severe as they are pulled over castings, stepped on and frequently lie in the water. A rugged type of heavily braided waterproof or vulcanized rubber cord is needed. The portable lamps themselves are subject to the same abuse and should be of a type which has no metallic parts which might be made alive by defective insulation. A defective drop cord may short-circuit in a man's hand and burn him. Furthermore, a wet, leaky cord in the hands of a man wet all over and climbing around on wet castings is a hazard of the worst order. Under these circumstances a shock even at 110 volts, and particularly at 220 volts, may be fatal. In any event a shock may cause a man to lose his hold or balance and result in a bad fall into the pit. On account of this hazard this company has abandoned the use of 220 volts in wheel-pit work and changed to a 32-volt system. A 220/32-volt transformer has been permanently installed at a central point in the station and a 32-volt circuit has been run the length of the station with connectors at each unit to which the leads going into the wheel pit can be attached. At each unit there is also installed a 32-volt receptacle in which a single drop light can be plugged to take care of the frequent case of a man going into the pit for a brief inspection with only one lamp. To prevent the danger of 32-volt lamps and drop cords being used in the ordinary 220-volt receptacles in other parts of the station, all of the 32-volt equipment has been made up with bayonet-type receptacles instead of the usual Edison base receptacles. This eliminates the danger of a 32-volt lamp exploding in a man's face when being plugged into a 220-volt circuit. A lighted oil lantern should be hung in the pit to guard against the danger of all the lamps being extinguished, as by electrical trouble in the station, blowing of fuses or accidental pulling of switches. In fact, this practice is desirable throughout the station at night."

FIELD EDITOR ELECTRICAL WORLD.

Boston, Mass.

Appliances Form Large Part of Connected Load in Resident Section

IN LAYING out or changing a distribution system at the present time the amount of connected load which consists of appliances must not be overlooked. In making a survey of the secondary distribution system in the residential section of Canton a condition due to the use of small motors and appliances was found which should have attention in designing distribution systems serving the better residence sections. In fact, the connected appliance load on one typical transformer was found to be about 42 per cent of the total connected load. In making this survey a transformer was selected which would be representative of the load carried by the several distribution transformers in these high-class residential sections.

On this transformer were twenty-three customers, seventeen two-wire and six three-wire, with a connected lighting load of about 30 kw., ranging from 800 watts to 2,000 watts for each customer. The appliance load was as follows: One 1-hp. motor, five washing machines (motor of each approximately ¼ hp.), twelve sweepers (motor of each approximately 1/20 hp.), five ironers (motor of each approximately ¼ hp.), one desk fan, two heaters (550 watts each), sixteen flatirons (500 watts each), four grills (maximum 1,000 watts, medium 500 watts each) and seven percolators (420 watts each).

No doubt, in the near future the company will be

required to furnish range services in this section of the city, at which time the appliance load will greatly exceed the lighting load.

O. C. KEENAN,
Ohio Power Company, Distribution Department.
Canton, Ohio.

Insulators Meggered on 110-Kv. Line in Fifteen Minutes per String

IN THE first job of changing insulators on a live 110,000-volt line of the Alabama Power Company 303 strings, seven units per string, were tested and defective units were replaced in about fifteen minutes per string average time. Before this time this company had never done any live-line maintenance, so in order to obtain first-hand information two representatives were sent to study the methods of the Georgia Railway & Power Company. They stayed about a week, learning the uses of different tools, necessary precautions to be taken and other tricks of the trade. On their return a dummy line was built and a crew was instructed on this line, so that no mistake would be made when they tackled a hot line.

The first job was to megger insulators on the first 92 "H"-frame structures of the Gadsden-Huntsville 110,000-volt line. Hot-wire tools were used to detach the line wire with suspension clamp from each insulator string, and then all defective units were replaced and the line wire reconnected to string. Three hundred and three strings, or 2,175 10-in. insulators, were tested during seventy-four hours of actual work, or about fifteen minutes per string. About 22 per cent of the strings had defective units. Actual work includes time taken in moving from structure to structure, but does not include time taken to travel to and from work. Work was not performed on wet days.

The success of live-line work depends on keeping the tools thoroughly dry, although moisture does not permanently affect their usefulness as their insulating properties can easily be restored by putting them in a drying box or room. Moisture on the tool handles causes a brush discharge, which can be recognized by a "fuzzy" feeling to the bare hands. The brush discharge is very useful as it warns the lineman when he grasps the handle too close to the live end. He should always grasp the handle far enough away from the live end, so that there will be no fuzz. A moist stick held near the line will cause a fuzzy feeling, thus warning the lineman that the stick should be dried before using.

A special box was made for transporting and drying the tools. The box is 13 ft. long, 18 in. wide and 18 in. deep with a compartment for a heater in one end. The tools are mounted on racks on the sides of the box and the blocks and tackle are hung from one end. When the box is used for drying purposes it is placed upright and the heater is turned on. The heater is made from elements of a headlight heater connected for three different degrees of heat. Each night the tools are placed in the box and the next morning they are in the best of condition. When the tools are taken from the box they are wrapped in oilcloth and carried to the job. Tools cared for in this manner will have very little fuzz, if any at all.

Among the tools employed is the "fuzz stick," a large wood-strain insulator which is used between the tackle and "come-along" when changing strain insulators. It is also used between tackle and conductor to pick up the conductor when changing suspension insulators. A special "fuzz stick" with four feet of insulation was employed. The "forked stick" resembles a pitch fork and it is used for handling suspension insulators. It is very useful for raising and lowering the string while uncoupling and recoupling suspension clamp.

The hawk-bill cotter-key puller is used for pulling cotter keys. A special cotter-key puller is made for working Ohio Brass hardware.

The coupling-pin stick, which is shaped something like a fishhook, is used for replacing coupling pins in clevis-and-eye type insulators. The coupling pin must be drilled in the head to receive the point of the coupling-pin stick on which it is wedged. The clevis and eye are lined up and the coupling pin is then pulled.

Alabama Power Company, L. T. SMITH.
Birmingham, Ala.

High-Tower Truck for Street-Lighting Maintenance

A TOWER truck with an unusual range of height has recently been placed in service on the municipal street-lighting system in Milwaukee. The lamps for the maintenance of which the truck is principally used are mounted 30 ft. above the street surface. As the truck is used largely on the downtown streets where trolley wires and other obstructions must be avoided, it has been necessary to provide a double lift by means of which the height of the platform can be varied from a minimum of 13 ft. to a maximum of 26 ft. The mechanism for raising and lowering the tower is installed behind the driver's seat and consists of two winches operated by a battery-driven electric motor. The mechanism is controlled by a two-position, three-push-button control system. One set of buttons is back of the cab within reach of the driver and the other is on the working platform, permitting complete control of the working tower by the man on the working platform or by the driver. Each set consists of three buttons, one each for "up," "stop" and "down." The working platform can be stopped in any desired position within the working range.

LAMPS 30 FT. ABOVE GROUND ARE REACHED FROM THIS MAINTENANCE TRUCK

Thirty-six 100-amp.-hr. cells mounted along the sides in the truck body supply the current for operating the tower control mechanism. The covers of the battery boxes serve as seats for the crew when more than two men are carried, and the space between the boxes is available for carrying material. The battery will lift the tower about forty times on one charge.

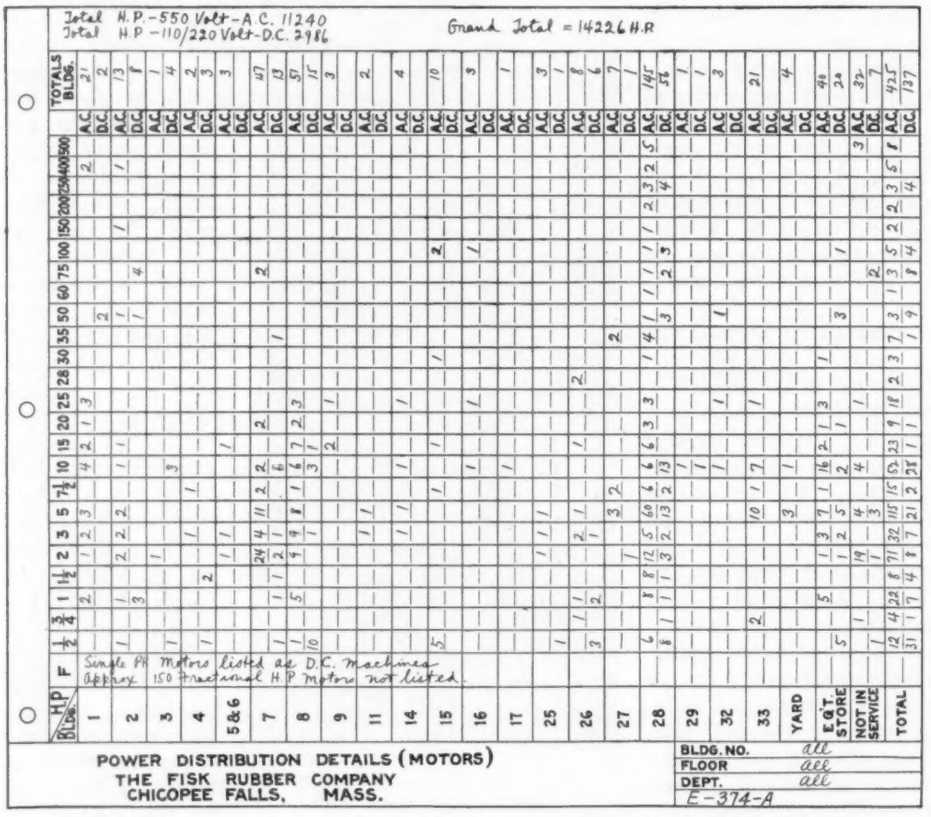
The working platform is 3 ft. x 6 ft. in size with

collapsible railings for two sides and one end. It can be revolved about an axis 18 in. from one end and locked in any desired position. A capstan winch, connected to the truck engine through a special clutch, is provided for cable pulling or other uses. The chassis is a standard 1,500-lb. truck chassis weighing 6,500 lb. with a four-cylinder motor.

Chicago, Ill. FIELD EDITOR ELECTRICAL WORLD.

Motor Record Saves Time in Inventory and Assignments

TO FACILITATE keeping a record of the number of each size and type of motor in the different buildings and in the storehouse the accompanying chart is employed by the engineering department of the Fisk Rubber Company, Chicopee Falls, Mass. The listing of sizes and buildings in the way shown enables the number of motors of a given rating in any particular building, group of buildings or the entire plant to be determined almost at a glance. Under each motor size the number of such ratings used in each building is given, with totals footed at the bottom of the columns.


Total H.P.-550 Volt-A.C. 11240
Total H.P.-110/220 Volt-D.C. 2986
Grand Total = 14226 H.P.
Single Ph. Approx. 150 Fractional H.P. Motors listed as D.C. Machines not listed.
POWER DISTRIBUTION DETAILS (MOTORS)
THE FISK RUBBER COMPANY
CHICOPEE FALLS, MASS.
BLDG. NO. all
FLOOR all
DEPT. all
E-374-A

DISTRIBUTION OF 562 MOTORS IN 21 BUILDINGS SHOWN ON 8½-IN. X 11-IN. SHEET

In case of relocation of motors following studies of their loading it is convenient to know in which buildings particular sizes are installed, and in making up inventories of plant equipment a tabulation of this kind is convenient in checking motor units. The chart is maintained in tracing form so that blueprints can be supplied to officials concerned at any time and is about 8½ in. x 11 in. in size, with loose-leaf perforations. In this factory 425 alternating-current and 137 direct-current motors are in service. A. E. TRUDO,

Fisk Rubber Company, Mechanical Superintendent.

Chicopee Falls, Mass.

Loop Test Determines Field Polarity of D.C. Machines

AFTER placing new field coils on a direct-current machine there is sometimes doubt as to whether the leads are connected to give the correct polarity. Even if suitable current is available for exciting the fields, it is not always possible to get satisfactory results with a compass, the polarity of which may be reversed by the strong field. In the case of compound-wound machines, it is especially inconvenient to supply the heavy current required in the series windings for excitation independent of the shunt coils.

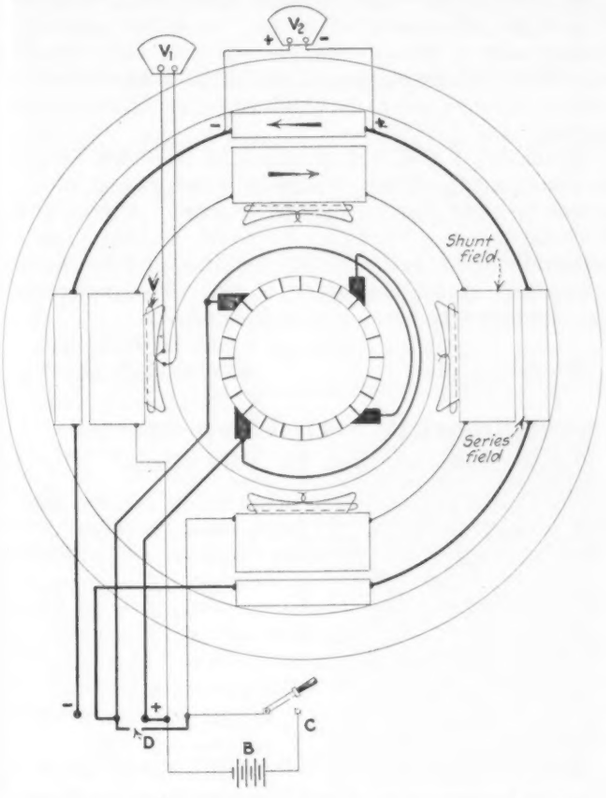
The writer has used what he calls the inductive loop test, with excellent results. For a compound-wound machine, the coils should be connected in the manner thought to be correct, and then tested as follows: Loop one turn of wire around each pole to be tested, as shown at *L* in the accompanying sketch. Connect battery *B*, consisting of several dry cells, to the shunt-field terminals, leaving the circuit open at one point *C*. If the armature circuit is connected in parallel with the shunt, open one leg, as at *D*, so that the battery will not be short-circuited through the armature. Connect a millivoltmeter (or a shunt ammeter without the shunt) to the terminals of one of the test loops, as at V_1. Close the battery circuit at *C* and then suddenly open it, at the same time noting the direction of meter deflection, caused by the induced emf. in the test loop, due to the dying flux in the pole.

Transfer the meter to the next loop, keeping the leads in the same relative position. Again make and break the circuit at *C* and note the direction of deflection at the time of break. If the deflection at the preceding pole was positive this one should be negative. In the same way proceed around the machine. If the meter deflection is positive, negative, positive, negative, etc., changing for each succeeding pole, the shunt field coils are properly connected together. If the meter deflection is so great that there is danger of bending the needle with negative deflection, the number of dry cells may be reduced. If the deflection is too small to be observed with certainty, several turns should be used in each test loop.

To test the series coils for alternate polarity proceed as outlined, with the meter connected to the series coil on each pole instead of the test loop. If the deflection is in the *same* direction for *all* the poles, the series coils are properly connected. It is necessary, of course, to be sure that the shunt coils are properly connected before testing the series coils.

After these tests have been completed and connec-

tions reversed where necessary, it remains to test the relation between the two groups of field coils, to determine whether the series turns will build up the field or cut it down. Assume either of the machine terminals as positive and trace out the direction of current in the



CHECKING POLARITY OF FIELD COILS OF COMPOUND-WOUND MACHINE

shunt and the series leads of any one pole, conveniently the uppermost pole of the machine, keeping in mind whether the machine is to operate as a motor or a generator. Referring to the sketch, suppose that the current would flow from left to right in the shunt coil, and from right to left in the series coil, if the machine were in operation, which would be the case for a cumulatively compounded motor. For a generator the directions would be the same. This refers to the direction from lead to lead, and not to the direction around the pole. Connect the battery to the shunt-field terminals as shown, with the battery polarity such that its current through the pole under consideration will be from left to right, as traced out for the operating current. Now connect the milli-voltmeter to the series coil, so that the positive meter terminal will be connected to the lead that would provide a current exit from the coil if the machine were in operation. In the case shown in the sketch, this will be the lead at the left of the pole, the connections being shown at V_2. Upon breaking the battery current at C the meter deflection should be positive. If so, the groups of field coils are connected in the proper relation to build up the field together. If not, the whole group should be reversed.

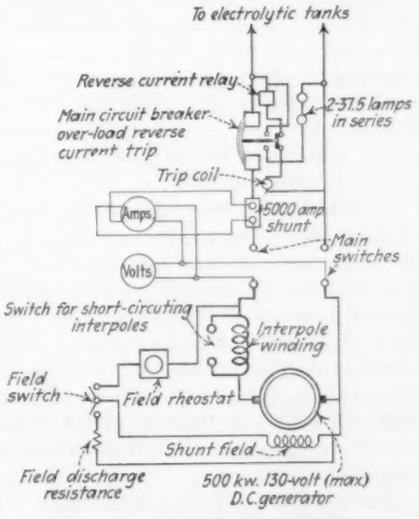
If any confusion arises, it is well to keep in mind that a dying flux tends to maintain the current that produced it. Thus when the flux produced by battery current in the shunt coils begins to disappear, the direction of emf. induced in the test loop or in the series coil is such as to send current around the pole in the same direction as the battery current.

Empire Tire & Rubber Corporation, Trenton, N. J. M. J. RICH, Experimental Engineer.

Switch Prevents Electrolytic Load Reversing Generator Voltage

TO PREVENT an electrolytic load from reversing current through an interpole generator when running at light load, a switch short-circuiting the interpole was installed recently in a Canadian plant. The machine was a ten-pole shunt-wound interpole direct-current generator rated at 75 volts to 125 volts, 4,000 amp. It was connected to an electrolytic load consisting of a number of cells in series. On a certain occasion a number of tanks were cut out, and it should have required only about 20 volts to circulate the 4,000 amp. The machine was adjusted to 20 volts at no load and thrown across the tanks. Immediately the current and voltage built up to high values, the circuit breaker kicking out, although it was set at 6,000 amp. Many theories were advanced for this, but the final conclusion was that the machine was acting as a series generator, the commutating-pole flux serving as useful flux for generating voltage on this light load. With a load having a much lower resistance than normal the shunt fields were weak and very unstable, due to armature reaction, causing the machine to build up as a series generator, under which condition the armature current cannot be controlled.

As is shown in the figure, the remedy was to short-circuit the commutating poles, allowing the machine to operate as a plain shunt-wound generator. This was found quite satisfactory at the light loads. The short-circuiting switch should be mounted as close to the generator as possible, in the same manner as an equalizer switch, owing to the fact that this machine is supplying an electrolytic load for the refining of zinc. The anodes being lead, the cathodes zinc and the electrolyte zinc sulphate, the result is a primary battery with potential of about 2 volts per cell, which is about 60 volts, there being thirty cells in series. This voltage is made use of as an auxiliary lighting source in emergencies. When the alternating current goes off the motor driving the generator, the reverse-current relay on the direct-current bus operates because of the voltage mentioned, opening the circuit breaker and preventing the generator fields from being reversed. When the breaker opens, a small switch mechanically connected to it connects in the two 37.5-volt lamps.

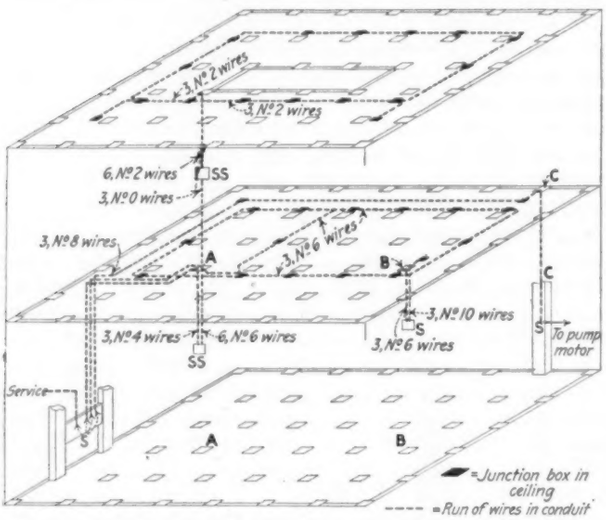


SWITCH TO SHORT-CIRCUIT INTERPOLES WHEN ELECTROLYTIC LOAD REQUIRES LOW VOLTAGE

Bonnington Falls, B. C. R. H. N. LOCKYER.

Perspective Wiring Diagram Helps Designer and Installer

A WIRING diagram drawn in perspective like the one shown in the accompanying sketch has been found in many instances quite valuable for the designing engineer, the construction crew and finally for the operating force after the building is completed inasmuch as it meets the needs of these various departments for ready



PERSPECTIVE DIAGRAM OF WIRING GIVES A CLEARER VIEW OF RESPECTIVE LOCATIONS

This shows mains and sub-mains run in conduit concealed in floors and posts.

and accurate reference. This type of diagram furnishes a comprehensive view of the entire layout and shows the distribution or grouping of equipment and the mains feeding it. The diagram also provides the operating crew with a quick reference for use when making changes or when it is necessary to make emergency connections. Moreover, when holes have to be drilled in the floor or walls for other purposes the perspective diagram will show where they must be located to avoid striking the conduit.

The diagram shows the basis of the perspective method of drawing. The angle at which the oblique lines are to be drawn as well as the scale will depend quite largely upon the subject to be covered. They should be determined by preliminary sketches. As it may be desired to make the diagram of a large plant upon a sheet that may be handled without difficulty, a metric scale can be used to advantage. By use of such a scale and starting all measurements from one point, the "creeping errors" due to measuring from point to point may be avoided.

For example, assume a building with rows of posts the length of the structure, and that the preliminary sketches have indicated the advisability of making the drawing to a scale of 10 mm. to the post space; then, measuring along the post line with the metric scale, the posts can be spotted at the 10, 20, 30, 40, etc., marks on the scale, thus avoiding errors that might occur if measurements were made from point to point. If in place of 10 mm. to the post space 12 mm. to the post space had been selected, 12, 24, 36, etc., can be easily read on the metric scale.

It will be found at times that it is advisable to make the measurements along the oblique lines on a basis differing from that used for the horizontal lines; for example, 8 mm. along the oblique lines may represent the same actual distance as 10 mm. along the horizontal lines. This difference, often a great help in the making of the diagram, is not a hindrance to its use, as the diagram indicates relative rather than actual locations. The diagram reproduced in the preceding column is drawn with a 30-deg. triangle which is very suitable in this case. For another case it is possible that a clearer drawing might be obtained by using some other angle.

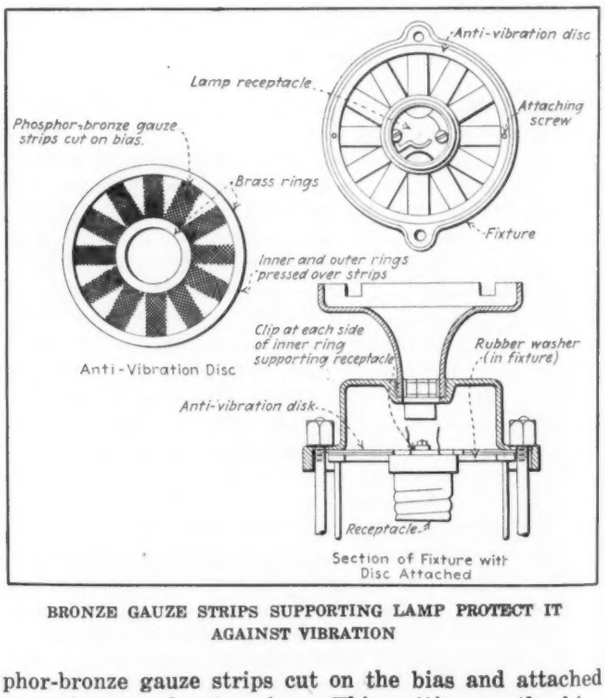
In making a diagram of this kind it should be kept in mind that the drawing is to be a picture and as such should be clear, concise and not crowded. Although the diagram is not a "drawing to scale" as that term is ordinarily used, yet accurate planning and measuring will assist greatly in laying it out. This refers especially to the floor plan that is drawn first.

C. W. KINNEY,
Worcester, Mass. Electrical Engineer.

Support Protects Lamp Against Destruction by Vibration

A METHOD of lamp suspension which enables metallic-filament lamps to be used where previously their use has been found inexpedient on account of vibration is shown in the accompanying drawing. The device has been tested under the most severe conditions on board ship and under gunfire, also by vibration set up by a pneumatic hammer, and in no instance has a metallic-filament lamp been broken, although carbon lamps in the vicinity which were fitted in ordinary sockets have been destroyed.

In this support the lamp is hung by a number of phos-



BRONZE GAUZE STRIPS SUPPORTING LAMP PROTECT IT AGAINST VIBRATION

phor-bronze gauze strips cut on the bias and attached to an inner and outer ring. This cutting on the bias effectively damps out any vibration. The support does not allow side sway, is unaffected by heat or atmospheric conditions and will readily dissipate heat set up when gas-filled lamps are used. C. M. WHITFIELD.

New York, N. Y.

Management and Policy

Embracing Central Station Commercial Organization and Management, Customer and Trade Relationships, Public and Financial Policies, Advertising, Selling and Service Methods

Utilities Just Groups of Thrifty Neighbors

A Well-Turned Thought from a Recent Address by S. B. Irelan, President of the Southeastern Section, N. E. L. A.

THE public does not appreciate that the capital employed and necessary in the utilization of our water-power resources and in the building of our steam-electric generating and transmission systems is in actual fact simply the combined small savings of a number of its thrifty neighbors. It has been gathered and collected by an organized group of individuals who serve them with vision and foresight and put the money to work for their benefit and use. Therefore the co-operation that to the man on the street sometimes seems to represent so much in power, booty and corruption is after all, just this—an organization of thrifty neighbors. This thought must be carried to the public so that they will stop and think and realize that our corporations' charters simply set out our objective and define how each thrifty neighbor is to share in the undertaking.

S. B. IRELAN

People already realize and appreciate the necessity of our giving continuous electrical service and its importance to the development of the communities and districts. They are ready and willing to support honest efforts of organized groups of thrifty investors to supply their community with this commodity, but must be truly informed of the various problems of our business and must realize that they also have a responsibility of securing an adequate supply of electrical energy for the community.

Today we have millions of dollars invested in our plants and facilities, and we shall require millions more each succeeding year. This new capital must come from our consuming public in all of our communities served and must represent the small savings of our thrifty neighbors. And we must organize as never before to present the investment advantages of our business to our customers.

In our own organization we must perfect our plans for an honest and prudent application of the funds gathered, then if we take our consuming public into our entire confidence and inform its members of the high principles and the high objectives of our business, we shall mold a favorable sentiment that will insure a sound and healthy business and will give the electrical central-station company a stability and earning power that will insure its securities a high position among investments.

The Local Pride Appeal in Small-City Stock Campaigns

INTEREST and local pride in the development of home industry has been turned to advantage in the sale of stock to customers by the Cape & Vineyard Electric Company, which supplies electric service in the Cape Cod and Martha's Vineyard sections of Massachusetts. The company has been encouraging customer ownership through small advertisements in the local press calling attention to the opportunity for safe and profitable investment right at home. One of the advertisements, which have attracted much interest in the Vineyard sound section because of their local appeal, is reproduced here.

STOP

investing your money away from the Island.

WHY

let people you know nothing about have your money to develop some other state?

INVEST

in your electric light company and get the benefit of Island improvement as well as a 6 per cent dividend every quarter.

Help Us Develop the Island.

Cape & Vineyard Electric Company

Henry C. Taylor, general manager of the company with headquarters at Falmouth, Mass., says that these advertisements have proved particularly successful in stimulating a sense of obligation to support the company's stock sale because it represents strictly a home industry.

"Why should strangers invest their money in our utilities if we have not sufficient confidence in the future of our communities to back them ourselves?" It is a pointed appeal that makes a strong impression.

District Customer Expense as an Index to Branch Office Efficiency

COST per month to serve each customer exclusive of the cost of generating and transmitting electrical energy furnishes the Texas Power & Light Company with a good index to the efficiency of its district offices. The accompanying tabulation of district customer expense includes the cost of distribution, municipal street lighting, local commercial and local general expense only, per customer for each district. Cost of produc-

tion, taxes, insurance, salaries and expenses not controlled by the manager are not included.

DISTRICT CUSTOMER EXPENSE OF BRANCH OFFICES

No.	District	No. Customers	Cost per Customer
1	Gainesville	1,743	$0.62
2	Tyler	2,000	0.72
3	Sherman	2,997	0.75
4	Bonham	1,889	0.79
5	Cleburne	3,111	0.80
6	Denison	3,718	0.89
7	Ennis	2,190	0.89
8	Waxahachie	2,610	0.90
9	Brownwood	3,098	0.94
10	Paris	2,893	0.94
11	Commerce	1,387	0.99
12	Waco	7,345	1.01
13	Terrell	1,464	1.04
14	Temple	4,194	1.05
15	Palestine	1,699	1.07
16	Taylor	2,467	1.07
17	Hillsboro	2,512	1.11
18	McKinney	3,607	1.26
19	Cement City	17	6.76
	Total	50,941	$0.95
1	Sweetwater	1,599	$1.12
2	Eagle Pass	1,140	1.24
3	Wichita Falls	7 717	1.70
4	Big Springs	674	1.72
	Total	11,130	$1.57
	Grand Total	62,071	$1.06

In comparing the standing of the different branches, due allowance, of course, is made for the local conditions in each district. But the net result is a practical comparison of the cost of doing business in so far as serving the customer is concerned, and should carry an impulse of intercompetition through the organization.

Results of Joint Selling Compared with Independent Effort

MUTUAL profit from co-operative selling effort is shown in the results of a recent flatiron campaign conducted jointly in Newark, N. J., by the Public Service Electric Company and the local electrical dealers. It gives a good comparison between a combined campaign and one in which the central-station company and the dealers worked independently and in some respects at cross purposes.

In June, 1919, the Public Service company sold a special iron of its own at $5.75. It was a standard iron of a well-known make but different in design, with a special finish, extra stand and attached cord. Dealers who sold the standard iron of regular design met the price of $5.75 but advertised it as "genuine." As a result there was considerable confusion in the minds of purchasers as to why there should be so much talk about the fine points of difference in the same make of flatiron. In that campaign the Public Service Electric Company sold about 5,000 irons, while the electrical jobber who is the local distributer for the standard iron sold a few more than 200 to the dealers.

This year the Public Service company scheduled its flatiron sale for September and arrangements were made so that the jobber could purchase irons for resale by dealers and department stores at the same price, thus making it a united effort by the entire electrical trade. The central-station company also purchased through the jobber. The outlook for business was not so good as in 1919, and it was expected that the sale would not net over 3,000 flatirons.

However, this sale was made a feature in twenty-five Public Service salesrooms, ninety-four dealers' stores and two large department stores. The largest department store, carrying a number of different makes of irons, in June, 1919, sold about fifty of this particular iron. This September the store sold over 300 during the general campaign. Dealers who before had taken only 210 from the jobber sold nearly 1,700. The Public Service Electric Company purchased during the sale just under 5,000 in spite of slack times and the fact that a September campaign has never before netted more than about 60 per cent of a June campaign.

The success of this campaign was attributed largely to the concerted publicity and the absence of any confusion in the public mind because of opposing advertisements as in the former sale. This is an excellent example of the value of co-ordinated effort in selling and the profit that accrues when the local electrical family really co-operates.

What Other Companies Are Doing—

Oklahoma.—A recent survey shows that with but a few exceptions all the public service corporations in Oklahoma are offering their capital stock to the public served. This proves that customer ownership thrives even where 10 and 12 per cent interest rates are common, as at present in this state. The yields vary from 7 to 9 per cent and the investment departments of these companies are very successful in spite of the high yields of building and loan associations and others. More than $16,000,000 capital stock of Oklahoma's public utility companies is now owned by customers and small stockholders.

Illinois.—A particularly useful seven-page booklet for promoting the sales of household electric appliances has been issued by the Public Service Company of Northern Illinois. On each page there is a photograph and description of one appliance, while the reverse side of the page carries an order blank for the appliance, stating the rate of monthly payments to be made with the regular electric light bill. The pages can be torn out of the booklet, signed and sent to the company as an order for the appliance. The last page is a detachable post card on which the customer may request catalogs on other appliances sold by the company.

Thompsonville, Conn. — The Northern Connecticut Light & Power Company closed its books on Oct. 13 on a 500-share issue which was 10 per cent oversubscribed in just four days. The company serves somewhat under 4,000 customers, and the territory was financially stagnant because of a recent protracted strike and an unsatisfactory market for the local tobacco crop. The sale was conducted under the general direction of Walter P. Schwabe, vice-president and general manager of the company, and under the immediate supervision of Percy H. Whiting, 1921 chairman of the customer-ownership committee of the New England Division of the N. E. L. A.

Massachusetts.—Through contracts placed with the Haverhill (Mass.) Electric Company and the Salem (Mass.) Electric Lighting Company, the Eastern Massachusetts Street Railway Company has been enabled to shut down its steam plants in these places and to simplify the supply of energy to substantial portions of its lines north of Boston. At Haverhill three 500-kw. rotaries have been installed and at Salem one 1,500-kw. and two 500-kw. rotaries have gone in for this service. The estimated output to be supplied at these places is 3,500,000 kw.-hr. and 6,000,000 kw.-hr. respectively per year. The contracts are for ten years and were negotiated by Vernon M. F. Tallman, power engineer with Charles H. Tenney & Company of Boston.

Digest of Electrical Literature

Including Brief Abstracts of and References to Important Articles Appearing in the Scientific and Engineering Press of the World

Generators, Motors and Transformers

Automatic Synchronizing Apparatus of the Siemens-Schuckert Works.—C. MICHALKE.—This apparatus, suitable for three-phase machines, is operated by a small, special motor the stator of which has a three-phase winding while its rotor represents a short-circuited single-phase field. The characteristics of such a motor are explained in theory and with diagrams. The complete apparatus consists of the motor, a time relay, an auxiliary relay, two contactors, three indicating lamps and the necessary transformers and resistors. A connecting diagram and several photos are shown.—*Elektrotechnische Zeitschrift*, Sept. 29, 1921.

Use and Abuse of Electric Motors.—J. M. HIPPLE.—This article describes the causes of trouble in electrical motors, particularly those used on railway cars, and tells what must be done to prevent such troubles. A table is given showing what characteristics govern the choice of material and what material is used for each part of the motor. Systematic maintenance is declared to be the wisest policy for preventing trouble.—*Electric Journal*, October, 1921.

Electric-Steam Generator for Low Voltage.—F. A. LIDBURY and F. A. STAMPS.—A description is given of an inexpensive form of apparatus and its method of employment for generation of steam by means of alternating current at voltages of from 100 to 500. This apparatus is particularly adapted to a plant which operates its own hydro-electric installation or purchases blocks of hydro-electric power and has available at times energy which it can use at little or no additional cost. Under such conditions considerable saving in fuel may be made by use of the electric boiler.—Paper presented before American Electrochemical Society, Oct. 1, 1921.

Lamps and Lighting

Incandescent Lamp Temperatures in Modern Practice.—CHESTER L. DOWS and WILLARD C. BROWN.—This paper is intended to clear up any questions on the operating temperatures of incandescent lamps. The material is divided into four main parts: (1) Temperature of lamps operated without reflecting and diffusing equipments; (2) temperatures of lamps operated with reflecting or diffusing equipments; (3) ventilation versus non-ventilation; (4) suggestions on the use of incandescent lamps in interiors which present special temperature problems.—Paper presented before Illuminating Engineering Society, Sept. 29, 1921.

Regulation of Automobile Headlights.—A report of the committee on motor vehicle lighting of the Illuminating Engineering Society says that state laws controlling approximately 43 per cent of the automobiles in the United States have embodied the system advocated by the society. The bulletin issued by the society gives tests to determine whether the headlights of the motor vehicles conform to the requirements of the law. Methods of using equipment in accordance with the regulations are also described, including a headlight controlling device, lamps, adjustment of tilt, focus adjustment, beam adjustment, etc.—Paper presented before Illuminating Engineering Society, Sept. 29, 1921.

Generation, Transmission and Distribution

Hydro-Electric Development in New Zealand.—Plans have been made and are being carried out for developing the three principal power sources in New Zealand. This article indicates the progress which has been made to date.—*Electrical Times*, Sept. 8, 1921.

Hydro-Electric Developments.—F. ROWLINSON.—This article considers the hydro-electric plants now under construction or soon to be constructed in every part of the world. Probable cost of the construction and probable amount of power which can be developed are given.—*Beama* (British Electrical and Allied Manufacturers' Association), September, 1921.

Water Powers of the World.—A. H. GIBSON.—A discussion of the developed and available water-power sites of the world and particularly those of Great Britain. Of the developed power in the empire, about 80 per cent is in Canada. Throughout the remainder of the territory only about 700,000 hp. is now developed, which is a little over 1 per cent of the power avaiable.—*Electrical Times*, Sept. 15, 1921.

Edinburgh Power Station.—S. B. DONKIN.—A description of a power plant with a present rating of 30,000 normal output from three 10,000-kw. turbo-generators.—London *Electrician*, Sept. 30, 1921.

Water Power in Iceland.—An account of the chief waterfalls in Iceland taken from the report of a traveler on horseback. Considerable power is available and the volume is remarkably constant.—*Electrical Times*, Sept. 15, 1921.

Developments in Power-Station Design.—A description of various equipment which has been developed in recent years for the boiler room. This includes pumps, oil burners, etc.—London *Engineer*, Sept. 2, 1921.

Water-Power Development.—A. H. GIBSON.—A study of the water powers available in Great Britain with suggested plans for developing them.—London *Electrician*, Sept. 16, 1921.

Installations, Systems and Appliances

High-Voltage Outdoor Oil Switches.—V. CANDIE.—The good results achieved in American power plants with outdoor apparatus seem to have been acknowledged by French engineers, and this article describes a new outdoor type of high-voltage oil switch manufactured by the French concern Métallurgique Electrique. The author of the article, who is the designer of the new switches, made an inspection tour through America to study our structures and their performance. As a consequence several of our well-established switch features reappear in the French design. For example, the oil-filled lead has been adopted. A good and

apparently original feature is a quadruple contact opening per phase, so arranged as to have a current transformer between the two main leads. Two movable rods with two contacts each complete or break the circuit. The primary and secondary of the current transformer have no insulation between them except oil, being interlinked in planes meeting each other at 90 deg. The entire contact-making apparatus is surrounded by a double-wall fireproof container, the two rods being separated from each other and from the main steel tank by oil spaces. Careful study has been given to the rupturing capacity of switches, and a formula for determining this capacity from certain dimensions of the switch is printed. The necessity that the contacts shall have a high mechanical rupturing speed—from 8 m. to 10 m. per second—and that the arcing contacts shall be carefully designed is emphasized. The author rejects the automatic opening device if the opening is actuated by an external current source, maintaining that in case of serious trouble this source is liable to fail. He advocates the use of the controlled current itself to open the circuit. A sectional drawing and several photographs of the switches accompany this noteworthy article.—*Revue Générale de l'Electricité*, Sept. 3, 1921.

Electrical Equipment for a Mine Hoist.—GRAHAM BRIGHT.—A discussion of the many factors which have to be taken into account when choosing a hoist for a mine. Numerous examples are given and sample load curves are shown. Various types of control are discussed.—*Transactions American Institute of Mining and Metallurgical Engineers*, September, 1921.

Units, Measurements and Instruments

Electrolysis Measurement and Mitigation.—An account of the first successful attempt to make, under practical conditions of field testing, a definite quantitative measurement of the current density discharged from a pipe at any point, this being the factor directly responsible for corrosion. The method described will probably prove the basis of future research work of the American Committee on Electrolysis, and the results of approaching surveys in certain cities will depend on its use and accuracy. It is an attempt to place the art of electrolysis testing on a definite engineering basis.—*Report of American Committee on Electrolysis*, 1921.

Electrochemistry and Batteries

Electric Silver Melting.—H. A. DEFRIES.—A description of the advantages of electric furnace melting of silver, relating how a more ductile and tougher silver results upon introducing an iron block into the bath.—Paper presented before American Electrochemical Society, Sept. 30, 1921.

A New Theory of the Corrosion of Iron.—J. NEWTON FRIEND.—An auto-colloidal catalytic theory, which postulates the corrosion as starting by the formation of colloidal ferrous hydroxide. This by-contact with the air forms hydrated ferris hydroxide, which in turn is alternately reduced by contact with iron and oxidized by contact with air, thus continuing the corrosion.—Paper presented before American Electrochemical Society, Sept. 29, 1921.

Rust Prevention by Slushing.—HAAKON STYRI.—An extended research which shows that for protection against rust by greases a thorough cleaning of the steel parts by an aqueous solution is essential. An oil emulsion which leaves an oil film for short-time protection is preferable. Such emulsions protect against rust.—Paper presented before American Electrochemical Society, Sept. 29, 1921.

Aluminum-Copper Alloys.—R. J. ANDERSON.—A discussion of the manufacture, properties and uses of the commercial aluminum-copper alloys employed in the United States.—Paper presented before American Electrochemical Society, Sept. 30, 1921.

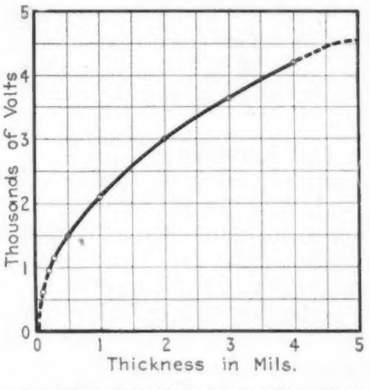
Telegraphy, Telephony and Signals

Rectifying Properties of Three-Electrode Valves.—L. F. PALMER.—An investigation undertaken for determining constants by which the rectifying properties of valves may be calculated. Curves were plotted from experimental data.—*Radio Review*, September, 1921.

New Experiments with the Telegraphone.—A. NASARISCHWILY.—In the "telegraphone," devised many years ago by Poulsen, a telephonic conversation was "fixed" by magnetic action upon a steel ribbon or a steel wire and could be reproduced later by passing this ribbon again over a small electromagnet in the winding of which a fluctuating voltage was set up which in turn energized a telephone receiver. The results obtained with this apparatus did not warrant its more general use, on account of the faintness of the reproduction. Since, however, the modern vacuum tube came into vogue, it has been possible to amplify the sound to any degree, and the author has built an electromagnetic phonograph on the combined principles of the telegraphone and the amplifying tube. He shows further that with this method a message may be "spoken into" a rail and may be picked up by the engineer of the train following. Here is a suggestion that might be of great value for railway signaling purposes.—*Elektrotechnische Zeitschrift*, Sept. 22, 1921.

Miscellaneous

Electrically Welded Steel Boats.—A. LAGANE.—The author advocates the use of electric welding instead of riveting for the steel hulls of boats. He uses metallic electrodes with a non-metallic coating, or the so-called "quasi-arc." As examples of accomplished jobs a 20-m. x 4-m. x 2½-m. boat and a 500-ton cargo boat are given. The former had to be transported on land for a distance of 3 miles (4.8 km.) before it was launched, subjecting all welds to a very abnormal stress, but no damage to the welded joints resulted.—*Revue Générale de l'Electricité*, Sept. 24, 1921.



BREAKDOWN VOLTAGES OF VARNISH APPLIED IN LAYERS

Insulation Experiments.—F. FERNIE.—A test made on the insulation resistance of various materials. Accompanying curves show the breakdown voltage of an air-drying varnish painted on in coats, each coat being allowed to dry before the next one is applied. The tests were made at 15 deg. C. between a sphere and plate.—*Beama* (British Electrical and Allied Manufacturers' Association), September, 1921.

News of the Industry

Chronicle of Important Events and General Activities in the Technical, Commercial and Manufacturing Fields With Announcements and Reports of Association Meetings and Conventions

Hearing on Colorado River Projects

THE Secretary of the Interior and the Director of the Reclamation Service expect to hold a hearing in San Diego Dec. 1. At this hearing the report of the Reclamation Service in which have been assembled all available data bearing on the problems of the Colorado River will be considered. Owing to the demands made on Secretary Fall's time, it has been impossible for him to conduct this hearing on the dates which have been fixed previously.

Bankers Opposed to Interest-Rate Basis for Water-Power Amortization

MEMBERS of the Investment Bankers' Association of America unanimously adopted at the annual convention in New Orleans last week a resolution urging the Federal Power Commission to modify the regulation on amortization of investment. The association went on record as being opposed to interest rate on bonds as a basis for determination of amortization.

The resolution, a copy of which has been sent to the Federal Power Commission, follows:

Whereas the federal water-power act of June 11, 1920, requires among other things that provision shall be made in licenses granted under such act whereby a large portion of the profits on the investment of the licensee in excess of a specified rate of return to be named in the license shall be used to amortize the investment; and

Whereas the Federal Power Commission's rules and regulations, effective June 6, 1921, provide among other things, in Regulation 17, as follows:

"Sec. 3. Specified Rate of Return.—Method of Determining.—A. The 'specified rate of return' upon the actual, legitimate investment of a licensee in any project or projects shall, for the purposes of this regulation, be one and one-half times the weighted average annual interest rate payable on the par value of the bona-fide interest-bearing debt of the licensee actually outstanding, in whole or in part, on account of the project property at the beginning of the period of amortization and of each calendar year thereafter; provided, that, if at the beginning of the period of amortization or of any calendar year thereafter the outstanding interest-bearing debt of the licensee on account of the project or projects under license, together with any other works or property operated in connection therewith, is less than 25 per cent of the actual, legitimate investment of the licensee in said project or projects, then and in such event for the calendar year next following the specified rate of return shall be two times the legal rate of interest in the state in which the project, or the greater part thereof, is located"; and

Whereas sound financing of water powers and other public enterprises necessitates the providing of a large part of the capital from the proceeds of stock to the end that the companies may maintain a high degree of credit and thus be able to sell their bonds on a low interest basis and always be able to finance the necessary facilities to enable such companies adequately to serve the public; and

Whereas the financing of public enterprises wholly through debt obligations is under modern conditions usually impracticable and in any event is always unsound and dangerous because it necessitates the selling of bonds on a high-yield basis and places the companies in bad credit, thus hampering them in serving the public and increasing the cost of any service that can be given to the public; and

Whereas the above-quoted regulation penalizes the development of water powers upon a basis that is safe for the investor and economical from the standpoint of the consumer and places a premium upon uneconomical development and unsound finance; and

Whereas the cost of money acquired through the sale of stocks depends upon many factors besides the amount of bonds outstanding or the effective rate of interest thereon;

Therefore, be it resolved, that the American Investment Bankers' Association respectfully call the attention of the Federal Power Commission to these facts and earnestly request a reconsideration and modification of the regulation above referred to as being in effect a serious deterrent to the development of the water powers of the nation and injurious to the public interests; and

Be it further resolved, that in the opinion of this association a requirement that when earnings equal one and one-half times the average effective bond interest amortization of investment shall begin is unfair to the investors in the case of properly financed companies and will seriously retard the development of water powers, and that this association earnestly urge the adoption of some standard as a basis for determining earnings applicable to amortization of investment other than the effective interest rate on bonded debt; and

Be it further resolved, that the secretary of this association be instructed to send certified copies of this resolution immediately to the members of the Federal Power Commission.

Most Powerful Radio Station Opened

THE Radio Central station of the Radio Corporation of America, on Long Island, declared by the corporation's engineers to be the most powerful yet built, was formally opened Nov. 5 by President Harding. Seated at his desk in Washington, the President pressed a key and an automatic sending device began to send out his message to receiving stations in twenty-nine countries. The message read as follows:

To be able to transmit a message by radio in expectation that it may reach every radio station in the world is so marvelous a scientific and technical achievement as to justify special recognition. It affords peculiar gratification that such a message, from the Chief Executive of the United States of America, may be received in every land, from every sky, by peoples with whom our nation is at peace and amity. That this happy situation may ever continue, and that the peace which blesses our own land may presently become the fortune of all lands and peoples is the earnest hope of the American nation.

WARREN G. HARDING.

Within a few minutes after the message had been flashed out replies were being received from England, France, Norway and Italy. All congratulated the Radio Corporation on the construction of a station that meant such a great advance in the science of wireless communication.

The station is situated near Port Jefferson, L. I., about 70 miles from New York. The site covers ten

square miles, and when completed the station will resemble a huge wheel with twelve spokes. The power house and sending station will form the hub, while each set of antennas, mounted upon six towers, will form a spoke. At the present time only two sets of towers have been erected, but it is planned to build ten more as it becomes necessary. Each tower is 410 ft. high, while the cross-arms are 150 ft. long. The distance between towers is 1,250 ft., each antenna system being almost 1½ miles long. Each antenna consists of sixteen silicon bronze cables, ⅜ in. in diameter, stretched horizontally from tower to tower. In all, 50 miles of this cable has been used for the first two sections. The ground system for each antenna consists of 450 miles of copper wire buried in the ground of the entire antenna system in starfish and gridiron fashion. Ten high-frequency Alexanderson alternators will eventually be used, giving an output of 20,000 kw.

A sending speed of 100 words a minute is possible with each unit, so that when the entire installation is completed twelve different messages may be sent simultaneously, each at the rate of 100 words a minute. The transmitting range of the station is virtually world-wide, preliminary tests having been heard in all parts of Europe and in Australia, South America and Japan. The station is to be operated by remote control from the New York office of the corporation, over wire lines built by the forces of the New York Telephone Company.

The receiving station is at Riverhead, L. I., 16 miles away. No operators are stationed there either, the signals being automatically transferred to wire lines and received at the New York office. The action is simultaneous from the time the signals are transmitted abroad, picked up by the aërial, to the moment of actual transcribing by the receiving operators in New York at the central traffic office, 64 Broad Street.

The formal opening of the station took place before about 400 visitors who had been brought from New York by the Radio Corporation on a special train. There were present a large number of men prominent in electrical and governmental circles.

In the absence in Europe of Edward J. Nally, president of the corporation, the guests were addressed by Owen D. Young, chairman of the board of directors. Mr. Young said that America now stood in the van of the world in radio communication, but that only courage, skill and the use of financial resources would continue to keep her there.

"England has taken advantage, and properly, of her geographical position to control European cable lines, and America should follow the same method," said Mr. Young. "With the construction of this station America becomes the center of radio communication. Poland has contracted with us for a station there, and we have just come from Europe, where an agreement was made with French, British and German representatives that the station to be built in Chile shall be jointly owned and operated. Another station is proposed for Brazil, and still more will be built in South America as the need arises. Of all these, Radio Central will be the center."

Mr. Young gave great credit to the engineers and executives of the General Electric Company, the Westinghouse Electric & Manufacturing Company, the Western Electric Company and the United Fruit Company for their aid in working out commercial, financial and technical problems. He announced that these companies all had agreed to turn over to the Radio Corporation all inventions dealing with radio for a period of twenty years so that the progress of American-controlled radio would not be hindered by any patent litigation whatever.

Approves Million and a Half Expenditure for Alaskan Cable

THE Director of the Budget has approved the expenditure of $1,500,000 for replacing the worn-out portions of the Washington-Alaska submarine cable system. The President has forwarded the request for this appropriation to Congress.

The cable composing this system is 2,675 miles in length. It is a single-strand conductor installed nineteen years ago. It is so worn that 95 per cent of the current escapes through grounds, abrasions and mechanical defects. Since it has been established that wireless communication to Alaska is subject to such great interruptions, the War Department urges that this appropriation be made so that a contract may be closed at the earliest possible time for this cable, allowing for its delivery next spring. It is intended that practically the entire amount of this appropriation shall be expended for the cable, as the War Department will use its own personnel for its installation.

Kentucky Association of Public Utilities Issues Convention Program

MORNING and afternoon sessions will be held by the Kentucky Association of Public Utilities when it meets in annual convention at the Seelbach Hotel, Louisville, on Tuesday, Nov. 22. In the morning the outlook for power and light companies, the electric railway industry and the telephone industry will be discussed by representatives of the respective interests. The speaker for power and light companies will be Donald McDonald, vice-president and general manager of the Louisville Gas & Electric Company. James P. Barnes will speak for the railways and M. F. Hosea for the telephone companies. This session will be followed by a luncheon at which Martin Insull, past-president of the N. E. L. A., will be the guest of honor.

In the afternoon "Public Safety" will be discussed by George H. McClain, manager of the Louisville Safety Council; "The Financial Outlook" by Richard M. Bean, president Louisville National Bank, and "The Functions of a Public Utility Association" by A. Bliss McCrum, secretary of the Public Utilities Association of West Virginia.

Puget Sound Power & Light to Supply Energy in Wenatchee Valley

FOLLOWING negotiations extending over a period of months, it is reported steps were recently taken to supply the Wenatchee Valley and parts of Chelan and Douglas Counties in Washington with electric power from the Seattle district under a contract entered into between the Puget Sound Power & Light Company and the Washington Coast Utilities Company, in which the former agrees to supply the latter's power requirements in this district for a period of thirty-five years. A total of 5,060 hp. will be delivered as soon as the necessary construction work is completed, but as expansion proceeds it is estimated that the load in this district may run up to 30,000 hp. or more. The con-

tract is an "open-end" instrument, allowing for unlimited development, the Puget Sound Light & Power Company standing ready at all times to meet the needs of the district as they develop.

It is planned to supply the power over a 110,000-volt transmission line running from Snoqualmie Falls to Wenatchee, a distance of approximately 100 miles. Preliminary surveys of the transmission-line route have been made, and it is expected that construction will begin early in the coming year. The work will probably be completed about the first of July.

The Washington Coast Utilities Company now owns and operates what was formerly the property of the Wenatchee Gas & Electric Company.

Use of 80,000-Volt Cables and Water-Cooled Generators in Europe

THE most impressive example of the electrical progress made by Europeans, according to Philip Torchio, chief electrical engineer of the New York Edison Company, who has just returned from a visit to Italy, France and England, has been the practical application of underground transmission pressures far above any voltages employed for that purpose in this country. One important underground circuit, he stated, has operated at 50,000 volts without failure for four years, while the Union d'Electricité of Paris is installing an extensive system of 60,000-volt cable transmission and in Italy cables have been built for service at 80,000 volts. In steam power-station development, the construction of the Gennevilliers central station of the Union d'Electricité is a remarkable example of the broad basis on which modern France is planning to cope with the problems of reconstruction, Mr. Torchio said. He has obtained from Colonel Mercier's engineers considerable information, but because they will undoubtedly shortly publish full details of the work he did not feel at liberty to say more than that the station will contain five 40,000-kw. turbo-generators, three of which are water-cooled. The generators will be connected to 6,000/60,000-volt transformers without intervening low-tension buses. Another plant specially mentioned by Mr. Torchio was the North Tees power plant in England, which contains two 20,000-kw., 40-cycle, 11,000-volt turbo-generators operating at 450 lb. steam pressure. Mr. Torchio said he was under the impression that the cost per kilowatt installed in both of the stations mentioned is considerably below the cost that can be obtained under American conditions.

PHILIP TORCHIO

"Several million horsepower of hydro-electric plants," Mr. Torchio continued, telling the ELECTRICAL WORLD of his impressions, "are being considered by France in the Pyrenees and Alps to conserve its natural resources. In this undertaking the government is giving its whole-hearted support and financial backing where necessary. Italy, too, has numerous water-power projects under consideration or construction. Several in northern Italy have been completed and are supplying energy to operate electric furnaces for making iron. The transmission system which has been recently installed to connect the water powers of the Alps and the Appenines has been productive of extremely beneficial results.

"Despite the great difference in size between Italy and the United States, Italy has 230 electric locomotives compared with 385 in this country. This high state of electrification is largely due to the topography of Italy and the almost prohibitive price of coal. About 4,000 miles of electrified track is now under consideration. In the north of Italy three-phase energy is being used chiefly to operate trains. Although this system has several disadvantages, it deserves more attention in this country than it has received. Between Rome and Naples a direct-current system is being installed, while near Rome a 45-cycle system is being constructed for experimental purposes.

"From a business point of view, Italy and France appear to be in a much better position than one year ago, their chief activity, namely agriculture, having increased considerably. The combination of the world-wide business depression and the inability of the Soviet government of Russia to fulfill its promises to the laborer has helped stabilize European labor conditions.

"As a result of the exchange situation, most of the European countries are raising barriers higher than the Woolworth tower against the exchange of labor and commodities. Unless each nation will lower import tariffs on some of the products which the other nations have to sell it cannot be expected that international business will improve greatly."

Tax Bill Now in Conference

THE much-revised tax bill is now in conference and the hope is expressed that it will be reported out within ten days. It passed the Senate on Tuesday with some further amendments and with others disallowed. All hope of a sales tax was lost when the Smoot amendments to that effect were rejected.

Reconsidering its former action, the Senate voted to strike out the Lodge amendment allowing holding companies to deduct from their capital stock tax the amount of such tax paid on the stock of subsidiaries. The capital stock tax on all corporations will remain as it is at present—one dollar on each $1,000, in excess of $5,000. Another effort to continue the excess profits tax after this calendar year failed.

In rapid succession the Senate rejected three amendments proposing changes in the corporation income tax rate of 15 per cent previously agreed on. As it now stands the Senate and House are in agreement in repealing the excess profits tax and the transportation tax on Jan. 1, 1922. The corporation tax fixed by the Senate is 15 per cent instead of 10 per cent as in the existing law, while the House has placed the figure at 12½ per cent. Of interest to the electrical industry in particular is the Senate amendment repealing taxes on portable electric fans and portable lighting fixtures.

The Senate also passed the House bill extending the emergency tariff, but amended so as to continue in effect until superseded by the permanent bill instead of expiring on Feb. 1. All provisions of the temporary law passed originally on May 27 were retained.

Merrill Makes Statement on Water-Power Depreciation Regulations

MEMBERS of the water-power development committee of the National Electric Light Association conferred with Secretary Merrill of the Federal Power Commission on Nov. 3 in regard to the depreciation regulation of the commission. After the conference Mr. Merrill said that he is very willing to receive practical suggestions in regard to this regulation but that he does not believe it wise to throw open these regulations for reconsideration at this time. A further conference was to have been had Nov. 10. Mr. Merrill stated that it is probable a plan can be worked out which will permit of some elasticity in the application of this regulation, but, he said, there are some who would have the principle of the regulation thrown overboard, and to this he is unalterably opposed. He believes it is necessary to perfect a system as nearly uniform as can be so that the licensees of the commission, in fulfillment of the requirements of the act, will not have to do more than submit copies of the reports which are made to the state commissions. In this way all questions of accounting can be left exclusively to the states, he pointed out.

Supreme Court Holds Municipal Plant Exempt from Regulation

AN OPINION unfavorable to the contention of the Springfield Gas & Electric Company in its case against the city of Springfield, Ill., was handed down by the Supreme Court of the United States on Nov. 7. The company contended that the exemption of municipal corporations from the provisions of the Illinois public utilities act is void under the Fourteenth Amendment to the Constitution and that the act should be enforced without regard to this exception. In its opinion the Supreme Court upheld the decree of the Illinois Supreme Court. Extracts from the decision just rendered are as follows:

"The plantiff's argument shortly stated is that in selling electricity the city stands like any other party engaged in a commercial enterprise and that to leave it free in the matter of charges while the plaintiff is subject to the Public Utilities Board is to deny to the plaintiff the equal protection of the laws. We agree with the Supreme Court of the state that the difference between the two types of corporation warrants the different treatment that they have received.

"The private corporation, whatever its public duties, is organized for private ends and may be presumed to intend to make whatever profit the business will allow. The municipal corporation is allowed to go into business only on the theory that thereby the public welfare will be subserved. So far as gain is an object, it is a gain to a public body and must be used for public ends. Those who manage the work cannot lawfully make private profit an aim as the plantiff's directors not only may but must.

"The fact that the municipality owned the plant for which its counsel fixed the rate was supposed to disqualify its officers at least when other plants were submitted to the judgment of strangers. But a city council has no such interest in the city's electric plant as to make it incompetent to fix the rates. Whatever the value of the distinction between the private and public functions of the municipality, the duty of its governing board in this respect, as we have said, is public and narrowly fixed by the act. The conduct of which the plaintiff complains is not extortion, but on the contrary charging rates that draw the plaintiff's customers away. The standard of these rates, however, according to the Supreme Court, is fixed by the Legislature. If the rates had been fixed by law at the present amounts, it would be vain to deny their validity. The trouble with the plaintiff's argument is that it attempts to go behind the interpretation that the Supreme Court has given to the acts concerned and to overwork the delicate distinction between the private and public capacities of commercial corporations. It is unnecessary to refer to the numerous cases upon classification by state laws in order to show that the distinction in question here is very far from being so arbitrary that we must pronounce it bad."

Authorizations Granted by and Sought from Federal Power Commission

THE Federal Power Commission has authorized a twenty-five year license for the Gladstone Mining Company of Buena Vista, Col. The application was filed Sept. 28 and was approved Oct. 31. The license covers a small power development on Denny Creek to be used for mining purposes. The commission has authorized the issuance of a preliminary permit covering a small power project at the government lock and dam in the Ocklawaha River in Marion County, Fla., where 600 hp. is to be developed for public utility purposes by the Ocklawaha Reclamation Farms of Ocala, Fla. A preliminary permit was granted the Louisiana Gravity Canal Company of Alexandria, La., covering a power project on Bayou Cocodrie in Rapides and Evangeline Parishes. Another preliminary permit was granted for the project of the Elmore Copper Company on the south fork of the Boise River in Elmore County, Idaho.

The commission also has ruled on four declarations of intentions. In the case of a proposed development by Ira Cornelius on the White River near Rogers, Ark., the commission found that the interests of interstate and foreign commerce were not affected. The proposal of the Pigeon River Lumber Company to build four dams in Pigeon River near the international boundary between Minnesota and Canada is of a nature to affect interstate and foreign commerce, the commission held. A similar finding was made in the case of the proposed project of Fred D. Breit in the Fox River near Dayton, Ill. The proposed project of F. M. Waring in the Juanita River near Newport, Pa., was held to come under the purview of the water-power act. The Juanita River is not navigable, but it is believed that the project will affect the navigable capacity of the Susquehanna.

An application for a preliminary permit has been filed by the Fort Klamath Meadows Company of Klamath Falls, Ore. The project involves 550 hp. intended to furnish light and power on the company's own land.

The San Joaquin Light & Power Corporation of Los Angeles has applied for a preliminary permit covering one large reservoir, three conduits, two diversion dams and three power houses on the South Fork of the Merced River and one dam and power house on the main stream of the Merced River. The project is located in Mariposa County, Cal. The power capacity is estimated at 55,000 hp. and the insatlled capacity at 110,000 hp.

American Valuation to Bring Price Statistics

A BENEFIT of the American valuation plan which had not been emphasized before has been pointed out by Secretary of Commerce Hoover. He calls attention to the fact that the adoption of this method of valuing imports will necessitate the building up of a much needed statistical service on prices. He believes the American valuation plan will require a very elaborate return of price data.

American Engineers to Design Brazilian Centennial Lighting

DESIGN of the general illumination of the Brazilian Centennial Exposition has been placed in the hands of American engineers. An appropriation of $500,000 has already been approved by the Brazilian government, which may be increased. The contract for the wiring has been obtained by the General Electric Company of Brazil, the Brazilian subsidiary of the International General Electric Company.

W. D'Arcy Ryan, designer of the Pan-American Exposition illumination and numerous other spectacles, including the National Capitol illumination on Armistice Day, together with his chief engineer and designer, is being sent to Brazil to take charge of the work. His engineer and designer are leaving for Brazil this week, and Mr. Ryan expects to follow about Nov. 25.

The contract was taken on a cost basis, which will permit the General Electric Company to take advantage of Brazilian stocks. The company is now engaged in manufacturing lamps in Brazil and has been able to build up a Brazilian stock of a million or more lamps.

Congress has appropriated $1,000,000 for the erection and equipment of the American building at the exposition, and it is understood that the British government as well as several others will have buildings. An effort is being made to standardize on the lighting of all the buildings.

Holds Pre-War Valuation Unfair for War-Time Rates

THE Court of Appeals of the District of Columbia this week reversed the opinion of the District Supreme Court which had upheld the valuation placed by the Public Utilities Commission on the property of the Potomac Electric Power Company. The higher court held that the commission erred in making the valuation as of July 1, 1914, rather than as of Dec. 31, 1916. The commission has decided to appeal to the United States Supreme Court.

The company is collecting 10 cents per kilowatt-hour, of which it keeps 8.075 cents and places the remainder in a fund pending the price outcome of the case. Already over $2,000,000 has so far been set aside and there is a possibility that the fund may reach $3,000,000 before the case is decided.

In issuing its decision the Appellate Court said:

> The commission found the fair value of the property as of July 1, 1914, to be $10,250,000. The uncontradicted evidence showed that between that date and Dec. 31, 1916, the time of said valuation there had been a sharp rise in values. Appellants contend that the commission as matter of law in reaching a conclusion as to the fair value of their property on Dec. 31, 1916, should have taken into consideration the increased value of that property as shown by the evidence between the earlier and the later dates. This the commission declined to do, but taking for a basis the fair value of the property as of July 1, 1914, the commission added net additional expenditures on the property subsequent to that date and they entirely ignored the evidence as to the increase in the value of the property forming the basis of the valuation of July 1, 1914.
>
> The trial court was of the view that the rule adopted by the commission was correct. We are unable to concur in that view.
>
> The principal object of valuation of cost is to provide a rate base and the statute clearly contemplates that the commission shall ascertain the value as of the time of said valuation and not as of some anterior date. It has been ruled many times that there must be a fair return to a public utility "upon the reasonable value of the property at the time it is being used for the public."
>
> In the present case the commission, in effect, declined to find the present value of the property because not satisfied as to how long existing conditions would continue. In assuming this position the commission must have overlooked paragraph nine of the statute, authorizing it at any time, of its own initiative, to make a revaluation of the property of any public utility.
>
> As conditions changed and values were substantially affected, it would have been the further duty of the commission to exercise its discretion and revalue the property. The conditions existing were world-wide, and, while their duration and future effect were problematic, there was no immediate prospect of a return to normal conditions. It may be suggested, although the point was not raised in the opinion of the commission, that practical difficulties would have been encountered in an attempt to ascertain the increase in value of the property between July 1, 1914, and Dec. 31, 1916. But there was substantial evidence before the commission as to the rise in values, and a brief investigation would have enabled the commission to determine, with substantial accuracy, how much in fairness should be added to the earlier valuation.

Electric Bond & Share Investigating American Cities Properties

THE American Cities Company, the 5 per cent-6 per cent collateral trust gold bonds of which are in default, is to be reorganized. The Electric Bond & Share Company has been invited to participate in the reorganization and pending its decision is making an investigation of the properties. The bonds in default and outstanding amount to $7,709,000 and are secured by a majority of stock of each of the underlying companies.

The subsidiary properties are the Birmingham (Ala.) Railway, Light & Power Company, Memphis (Tenn.) Street Railway Company, Little Rock (Ark.) Railway & Electric Company, Knoxville (Tenn.) Railway & Light Company, Houston (Tex.) Lighting & Power Company and New Orleans (La.) Railway & Light Company.

The American Cities Company in turn is controlled by the United Gas & Electric Corporation.

Utah Light & Power Issue Sells on 6½ per Cent Basis

AS A FURTHER indication of the strengthening of the public utility security market is the eagerness with which a $2,000,000 issue of first lien general mortgage 6 per cent bonds of the Utah Light & Power Company due on Feb. 1, 1944, was taken up by investors this week on a 6½ per cent basis. This is a particularly low yield for public utility bonds.

A $4,000,000 issue of cumulative 8 per cent preferred stock of the Connecticut Light & Power Company was placed on the market this week at 98, yielding 8.16 per cent.

The Proposed Engineering Center for San Francisco

PLANS are under way for interesting a large number of San Francisco engineers in the movement for constructing and operating an office building of from twenty to twenty-five stories which would be recognized as a center of engineering activity. The movement is fostered by the San Francisco Electrical Development League, which estimates the cost of the project at about $2,000,000. Several schemes for financing have been considered, the preferred means being to accept the offer of a capitalist who has agreed to advance $1,700,000 toward the total amount necessary provided that 1,500 San Francisco engineers will buy stock in the enterprise to the extent of $200 each. An alternative plan is to accept an offer of capitalists to meet the entire cost of construction, provided that engineering societies, the Engineers' Club and a representative number of other engineering interests agree to become tenants.

Rocky Mountain Committee on Public Utility Information Formed

PERMANENT organization of the Rocky Mountain Committee on Public Utility Information has been completed. The committee, whose field will cover the states of Wyoming, Colorado and New Mexico, was organized under the joint auspices of the Rocky Mountain Division of the N. E. L. A., the Wyoming Utilities Association, the Colorado Electric Light, Power and Railway Association and the New Mexico Utilities Association. The presidents of these four organizations are to be ex officio members of the committee.

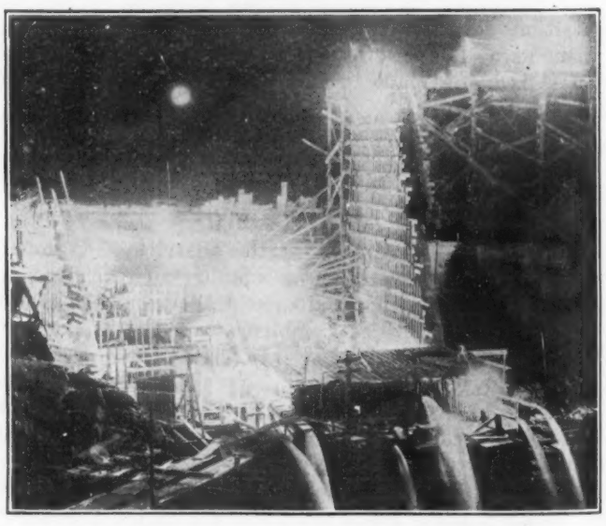
The full membership of the committee and its officers are as follows: T. O. Kennedy (chairman), Denver (Col.) Gas & Electric Light Company; V. L. Board, (secretary and treasurer), Denver Gas & Electric Light Company; Frank Kivel, Denver Gas & Electric Light Company; Norman Read, Colorado Power Company, Denver; W. C. Sterne, Summit County Power Company, Denver; Walter F. Brown, Mountain States Telephone & Telegraph Company, Denver; John J. Cooper, Mountain Electric Company, Denver; John F. Greenawalt, Mountain States Telephone & Telegraph Company; E. A. West, Denver Tramway Company; E. A. Phinney, Jefferson County Power & Light Company, Golden, Col.; Fred Norcross, Home Gas & Electric Company, Greeley, Col.; Frank J. Dostal, Colorado Springs (Col.) Light, Heat & Power Company; Charles A. Semrad, Western Light & Power Company, Boulder, Col.; W. F. Raber, Arkansas Valley Railway, Light & Power Company, Pueblo, Col.; E. P. Bacon, Natrona Power Company, Casper, Wyo.; Arthur Prager, Albuquerque (N. M.) Gas & Electric Company; H. D. Randall, General Electric Company, Denver; L. M. Cargo, Westinghouse Electric & Manufacturing Company, Denver; A. C. Cornell, Western Electric Company, Denver; D. P. Strickler, Colorado Springs (Col.) & Interurban Railway Company; J. A. Clay, Western Colorado Power Company, Durango, Col.; W. P. Southard, Trinidad (Col.) Electric Transmission Railway & Gas Company; E. J. Condon, Jr., Intermountain Railway Light & Power Company, Colorado Springs; A. E. Bent, Tucumcari (N. M.) Light & Power Company; C. M. Einhart, Roswell (N. M.) Gas & Electric Company; J. H. MacMillan, Santa Fé (N. M.) Water & Light Company; E. A. Bradner, Las Vegas (N. M.) Light & Power Company; F. H. Roberts, Popo Agie Light & Power Company, Riverton, Wyo.; J. J. Withrow, Sheridan (Wyo.) County Electric Company, and R. R. Beddow, Intermountain Railway, Light & Power Company, Laramie, Wyo.

Automatic Substaions Discussed

SPEAKING before the Chicago Section of the Association of Iron and Steel Electrical Engineers on Oct. 31, Charles H. Jones of the Chicago, North Shore & Milwaukee Railroad said that one substation on that road had only 0.485 failure in 1,000 operations. Mr. Jones also asserted that should the alternating-current supply be lost and a number of trains be stalled near the substation, when the lines were again energized the substation would go through its usual operations, but the direct-current output would be curtailed by the load-limiting resistors, which would merely decrease the acceleration of the trains instead of pulling the circuit breakers.

The future of the substation, in Edward Taylor's opinion, depended upon standardization of equipment, and he predicted that present apparatus would not be recognizable within five years. Gordan Fox favored the automatic substation for steel mills because it would require less operators than the semi-automatic station. Because there are many cases where attendants cannot be eliminated completely, some of the engineers discussing the subject favored the semi-automatic type in which the main supply circuit switches must be closed by an attendant, after which the equipment cares for itself automatically.

Maine Utility Works Night and Day in Race Against Record Drought



BY CONSTRUCTING a dam on the north channel of the Kennebec River at Skowhegan, Me., the Central Maine Power Company is raising the head from 25 ft. to 32 ft. upon the waterwheels of the Weston station and increasing the capacity of the three present generating units from 2,500 kva. to 3,750 kva. each. This photograph was taken at 1 a.m. Oct. 14, as the company is maintaining night shifts on this job and in the installation of additional boiler capacity at its Farmingdale steam plant in a race against the worst drought experienced in eighteen years. So far no industry has suffered for power, although the maximum daily output recently reached 408,000 kw.-hr. against 310,000 kw.-hr., largest twenty-four-hour output in 1920.

Current News and Notes

Timely items on electrical happenings throughout the world, together with brief notes of general interest.

New Norwegian Accumulator.—A Reuters message from Christiania, Norway, announces that an important new invention has been made there by Court Gross. The invention is a storage battery said to possess more than eleven times the capacity of those now on the market. By its use, it is said, an electric motor car can run six or seven times longer than with the older types.

Great Northern Power Will Extend Reservoirs to Increase Employment.—To afford the greatest possible amount of employment the Great Northern Power Company of Duluth, Minn., will throughout the winter extend its reservoirs to provide for future needs. A substantial reservoir will be built on the Whiteface River, where work has already been started, and work will also be carried on on several smaller storage basins.

War Claims Against Telephone and Telegraph Companies.—Transfer to federal courts of claims for loss and damage against telegraph, telephone, cable and radio companies during the period of federal control will be precluded if a bill introduced in the Senate by Senator Sheppard of Texas should be approved. The bill provides that the mere fact of federal control is insufficient to bring the suit within the jurisdiction of a federal court.

Palmer Electric Company Establishes Bonus System.—The Palmer Electric Company of Des Moines, Iowa, has established a system of bonuses by which every man making accessory sales will be rewarded. To maintain the force over the winter it was decided also to place the shop on an hour basis, each man to be paid only for the productive hours he works each day and the company's inspector to have the privilege of reducing the time charged a customer if there is evidence of time being wasted. Should work be returned, the workman will lose the time. The hourly rate of pay has been increased.

Ohio Village Fights Discontinuance of Electric Service.—Because the village of Ridgeway, Ohio, is in arrears more than $1,500 for street-lighting service, the Mount Victory Electric Light & Power Company has discontinued the street-lighting service in that village and has applied to the Ohio Public Utilities Commission for permission to cut off all other service to Ridgeway also. The village has hired counsel and expects to fight the application. It is declared that almost every house in Ridgeway has installed electrical fixtures and appliances which would be useless if the service were stopped. An attempt is being made to secure a settlement by allowing a slightly higher rate for domestic service and by arranging for a five-year bond issue to cover the amount in arrears on the street lighting.

Nova Scotian Water-Power Development.—The first undertaking of the Nova Scotia Power Commission, which is only two years old, was a development at St. Margaret's Bay primarily intended to supply the city of Halifax. An initial installation of 10,700 hp., delivering approximately 20,000,000 kw.-hr. a year in the city, has been made and constitutes the largest undertaking of its kind in the province. Ultimately the rating will reach 15,000 hp. and the output 30,000,000 kw.-hr.

Electricity Aids Interpretation of Church Service by Color.—Four large circular lanterns which shed many variations of blue, red, amber and green as the electricity was switched on and off were installed in a New York City church recently, the idea being that by the use of "interpretative" lighting the ritual and music of church services can be made more impressive and their emotional significance enhanced. The idea appears to be a development of the "color harmony" theory that has been demonstrated before the Illuminating Engineering Society and others and which aims to synchronize color and music.

Rochester Company's New Rural Transmission Line.—A new 35,000-volt, 60-cycle transmission line between Rochester and Webster, N. Y., which takes the place of a former 25-cycle line energized from the wires of the Rochester & Sodus Bay Railway, is described in the October house organ of the Rochester Gas & Electric Company. An interesting feature of the new line is that it carries lead-covered cable overhead on poles for 11,000-volt operation, the smaller space occupied and the freedom from danger and trouble being thought to outweigh the difficulty and cost of installation. Unusually rugged construction was necessitated, particularly where crossings with other lines were made, and in one place stone-filled cribs had to be constructed in order to support the poles where a marsh was crossed.

First Canadian Electric Light Plant.—In sketches of the life of the late Senator Frederic Nicholls of Canada appearing in our columns it was stated that "the first system for supplying electric light to the Canadian home was the Toronto Incandescent Light Company, which came into being June 26, 1889." An authority on such matters, John Murphy, electrical engineer of the Department of Railways and Canals of the Dominion of Canada, brings to our attention the fact that the Chaudière Electric Light & Power Company, predecessor of the present Ottawa Electric Company, began to supply electric lighting to Canadian homes on May 21, 1887, more than two years before the date of the Toronto installation, thus making the Ottawa station the pioneer electric light plant of Canada. We are glad to set the record right in the interest of historical accuracy.

Associations and Societies

A complete Directory of Electrical Associations is printed in the first issue of each month.

Electrical Supply Jobbers' Association.—The general meeting of this association will be held at the Hotel Cleveland, Cleveland, Ohio, on Nov. 30, Dec. 1 and 2. It will be preceded by a meeting of the Atlantic Division, to be held at the same place on Nov. 29.

New York Section, Illuminating Engineering Society.—This section will consider "Color Psychology and Its Application in Church Lighting" at its next meeting, Nov. 17. A practical demonstration will be given and there will be a discussion of the technical and mechanical phases of the system.

New York Companies' Section, N. E. L. A.—The first meeting of this section for 1921-22 will be held on Nov. 16 at 130 East Fifteenth Street. John W. Lieb, vice-president of the New York Edison Company, will deliver his lecture on Leonardo da Vinci and H. M. Aylesworth, executive manager of the N. E. L. A., will talk of the national body.

Institute Section Meetings.—Section meetings of the A. I. E. E. for next week are scheduled as follows: Nov. 14, New York, "The Great Lakes-St. Lawrence Canal"; Nov. 14, Philadelphia, "The One Best Way to Do Work," by Frank Gilbreth; Nov. 18, Akron, "The Superpower Survey Report," by W. S. Murray; Nov. 18, Schenectady, "Energy," by David B. Rushmore.

Activities of the A. I. and S. E. E.—The 1921-1922 activities of the Association of Iron and Steel Electrical Engineers are now in full swing, and programs for the next meeting of each section have been formulated as follows: Cleveland District Section, Nov. 14 (joint meeting with the Cleveland Safety Council), "Mechanical Breathing Apparatus as Compared with Manual Methods of Resuscitation from Electrical Shock and Other Asphyxiation," by E. H. Lyon, president Cleveland Breathing Machine Company; Pittsburgh Section, Nov. 21, "Large Power Rectifiers," by James H. Milliken, consulting engineer, Chicago; Chicago Section, Dec. 16 (joint meeting with Western Society of Engineers), "Electricity in Steel Mills," by W. S. Hall; Philadelphia Section, Dec. 20 (joint meeting with A. S. M. E. and Engineers' Club), "Yard Electrification of Industrial Plant Railways," by D. M. Petty, electrical superintendent Bethlehem Steel Company, Lehigh plant.

Coming Meetings of Electrical and Other Technical Societies

Electric Power Club—Cleveland, Nov. 14-15.

A. I. E. E. Section Meetings—New York, Nov. 14; Philadelphia, Nov. 14; Worcester, Nov. 17; Akron, Nov. 18; Schenectady, Nov. 18; Kansas City, Nov. 25; Toronto, Nov. 25; Minnesota, Nov. 28; Atlanta, Nov. 30; Baltimore, Dec. 8.

A. I. and S. E. E.—Cleveland Section, Nov. 14; Pittsburgh Section, Nov. 21; Chicago Section, Dec. 16; Philadelphia Section, Dec. 20.

A. I. E. E. and Society of Naval Architects and Marine Engineers — New York, Nov. 17.

Central Division, Electrical Credit Association—Chicago, Nov. 17-18.

Philadelphia Section, American Welding Society—Philadelphia, Nov. 21.

Kentucky Association of Public Utilities—Louisville, Nov. 22.

Electrical Supply Jobbers' Association—Cleveland, Nov. 30, Dec. 1-2. Atlantic Division, Cleveland, Nov. 29.

Recent Court Decisions

Findings of higher courts in legal cases involving electric light, power and other public utility companies

Fact that Automobilist Could Have Seen Pole with Which He Collided Not Sufficient to Nonsuit Him.—In sustaining a nonsuit found by the lower court in Luckhart vs. Director-General of Railroads, the Supreme Court of Washington found the plaintiff, who sought damages because of his collision with an electric light pole while driving an automobile, to have been negligent and therefore not entitled to recover a verdict, but none the less asserted that the mere fact that the driver was able to see the pole was not in itself enough to establish negligence on his part. (200 Pac. 564.)*

Impairment of Contract in Franchise Antedating Commission Law Forbidden.—Where a franchise was accepted by a company with a provision limiting the rates, the Supreme Court of New York has held (Village of Warsaw vs. Pavilion Natural Gas Company), the subsequent passage of the Public Service Commissions law permitting increases of rates by filing a schedule and publishing it, as ordered by the commission, does not apply, as it would impair the obligation of the contract contained in the franchise; nor does an order of the commission not retroactive in its terms authorize an increase in rates for service prior to the order. (190 N. Y. S. 79.)

Powers of Pennsylvania Commission.—When the appeal of the Pennsylvania Power & Light Company from the decision of the Superior Court of Pennsylvania reversing the Public Service Commission and holding that a public service company cannot increase its rates while a prior increase complained against remains undetermined by the commission reached the Pennsylvania Supreme Court (see ELECTRICAL WORLD, Oct. 1, page 687), that body found the decision of the commission that it had no power to forbid the increase was a proper one, declaring that the Superior Court fell into error in not considering the general scope and scheme of the public service act and its applicability to utilities in the performance of their various obligations. The act did not mean abrogation or restriction of the rights of public service companies to manage their own affairs to the fullest extent consistent with the protection of the public's interest. "Public service business," the court continued, "occupies a peculiar position in the community, interwoven as it is with communal life, of a nature monopolistic in character, compelling the public to be its customer, whether it would or not, operating under laws with governmental powers not given to ordinary companies. In determining whether the exercise of a right such as now discussed offends against the regulatory control necessary for such concerns, in the interest of the convenience, accommodation and safety of the public, the authority given the commission should be liberally construed, and that incidentally necessary to a full exposition of the legislative intent be upheld as being germane to the law. Where, therefore, the unrestricted exercise of existing powers tends to nullify the commission's control, a restrictive use is intended, its extent to be determined by the commission, with a right of appeal to the courts as provided by the act. . . . There is no limitation on the number of times a company 'may demand, collect and receive fair, just and reasonable rates.' When a given rate, because of business conditions, becomes unfair, unjust and unreasonable, the company has the power to demand fair, just and reasonable rates. It initiates rates when the necessity here defined compels it; the wavering scale of reasonableness is the standard, and of it the utility is the sole judge in the first instance, subject, of course, to what may later follow when the commission's machinery is started. This authority certainly is not hostile to the public service act, but makes the act a more workable one, secures to the public the service demanded, the public being fully protected by complaint and reparation. . . . Governmental control over these essential elements of corporate existence must be carefully exercised. The commission and the utility are not dealing with a purely legal proposition, subject to inflexible rules of law, but with an ever-changing economic condition, through this administrative body, with powers adapted to fit recurring changes in economic life. To attempt to confine it or the utility to the sometimes unwieldy procedure adopted by the courts would be subversive of all the good intended by the act. The business disposed of by this body, with the speedy and expeditious manner in which it is conducted, is enormous. Certain matters before it must assume a legal aspect, as appears from the act. But subjects like that now before us (frequency of change of rate of utility) are not to be adjudged by technical legal procedure. They are regulated by economic law, which, so far, courts or legislatures have not been able to control. What may be an adequate rate today next month may be quite unreasonable, and this through circumstances beyond the control of the commission, utility or courts. Therefore the right to initiate and change is fundamental to the company." (114 At. 649.)

Relief from Alleged Excessive Charges in New Jersey Must Come from Commission.—The New Jersey Court of Chancery has refused to the city of Millville an injunction against the collection of increased rates by the Millville Electric Light Company, whose application was heard but not passed upon by the old Board of Public Utilities Commissioners. The company claimed that with the expiration of ninety days from the date of the application its amended rates became legal, while the city held that the original application had been withdrawn. The new commission refused to consider the city's request for its adjudication, on the ground that it could not take up holdover cases from its predecessor. The court has refused the city's application, holding that relief can come only through the Board of Public Utility Commissioners.

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Commission Rulings

Important decisions of various state bodies involving or affecting electric light and power utilities

Reasonableness of Rates and Value of Service.—Rates sufficient to produce a full return should not be allowed, the Wisconsin Railroad Commission observed in granting increased rates for gas to the Interstate Light & Power Company, when such rates would exceed the value of service and mean a probable discontinuance by consumers.

Municipal-Plant Rates.—Authorizing increased electric rates for the municipal plant of the village of Argyle, the Wisconsin Railroad Commission declared that separate schedules should be established for light and for power service rendered by a municipal electric plant, that street lighting service should return its share of the cost of operation, that energy used for electric pumping in the municipal waterworks should be metered, and that a charge should be made for energy used to operate a city stone crusher.

Grounding Secondary Circuits Insisted On.—Declaring that a large number of fatalities and less serious accidents have occurred in the last few years through the failure of electric light and power companies to ground their secondary circuits properly, the Public Utilities Commission of Illinois ordered the Springfield Gas & Electric Company to comply with the commission's rule on the matter. Failure to do so, it pointed out, "permits excessive and dangerous voltages to exist on wiring in buildings and sometimes makes it possible for persons to come in contact with dangerous voltages while handling lamps or appliances."

Full Return Cannot Always Follow at Once Upon Plant Extension.—In reducing the amount of surcharge temporarily allowed the Great Western Power Company (see ELECTRICAL WORLD, June 4, page 1329), the California Railroad Commission observed: "The reasonable amount on its investment in the Caribou development which applicant is entitled to earn during the present year is difficult of definite determination. The contention of applicant that it should be allowed a full return upon all of the money invested for the period when the plant is physically in operation, even during the present depression when an actual decrease in business is estimated, does not appear to be reasonable. Applicant has increased its hydro-electric capacity in one installation by 60 per cent and its total plant capacity by approximately 45 per cent. If it sells no more power than originally estimated to the Pacific Gas & Electric Company, it would without question be unfair to the existing consumers to require them to bear the entire additional burden this year. Applicant cannot expect during a period when its business does not increase to receive a full return on all additions immediately upon an increase of approximately 40 per cent in its fixed charges and plant capacity."

Men of the Industry

Changes in Personnel—Responsibilities and Association Appointments of Men Engaged in Professional, Executive, Operating and Commercial Branches of the Industry

Eugene H. Rosenquest, the new president of the Empire State Gas and Electric Association, has been engaged in the business of supplying gas and electric light and power for twenty-five

E. H. ROSENQUEST

years. He is the president of the Bronx Gas & Electric Company, which supplies gas and electricity to the eastern section of the Borough of the Bronx, New York City. Mr. Rosenquest is a member of the American Institute of Electrical Engineers, the National Electric Light Association and the Illuminating Engineering Society. He has served on the executive committee of the Empire State Gas and Electric Association for the past ten or twelve years and has taken an active interest in all its affairs.

Dr. Kenneth G. Matheson, president of the Georgia School of Technology, has accepted the presidency of the Drexel Institute of Philadelphia and will assume his duties there in April next.

John S. Hester, superintendent of overhead and transportation of the Laurel (Miss.) Light & Railway Company, has been promoted to succeed A. B. Coryell as general superintendent, and will supervise the operation of the power plant in connection with other duties.

Russell G. Warner has been promoted from instructor in electrical engineering to assistant professor in electrical engineering at Yale University. He will handle the technical courses formerly conducted by Prof. H. V. Bozell, who has resigned to devote his entire time to the McGraw-Hill Company as co-editor of the *Electric Railway Journal* and editor of *Bus Transportation*, which is a new monthly section of the first-named publication. For the past year and a half Professor Bozell has devoted part time to Yale in addition to his duties as co-editor of *Electric Railway Journal*.

G. F. Lackey, consulting engineer, has been elected vice-president of the Colorado Springs (Col.) Light, Heat & Power Company to succeed Rush L. Holland, who has resigned to become Assistant Attorney-General of the United States.

Lieut.-Col. S. W. Fleming, Jr., of the firm of Gannett, Seelye & Fleming, engineers, Harrisburg, Pa., has been appointed by Governor Sproul of Pennsylvania a member of a commission to study the battlefields of France and Belgium with the object of marking where Pennsylvania troops fought in the war.

A. H. Horton is now directing a new census by the United States Geological Survey of developed water powers in the United States. This survey will, it is believed, be completed by Jan. 1. It was under Mr. Horton's direction that the Survey prepared state maps showing the location of power stations and transmission lines used in the public service.

Mr. Horton is a native of Franklin, Pa. His primary education was obtained in the public schools of Silver Creek, N. Y. He received his engineering training at Cornell University, where he was graduated in 1898. His first year out of the university was spent in the service of the United States Deep Waterway Survey. He then spent five years with the United States Lake Survey, after which he was for two years a member of the staff of the United States Reclamation Service.

Since 1906 Mr. Horton has been with

A. H. HORTON

the Geological Survey. He began as a junior hydraulic engineer and has risen through various promotions to the important position of chief of the power resources division. In addition he is the district engineer in charge of the Survey's power work in the middle Atlantic and Ohio River districts.

Henry G. Morris has been appointed by Secretary Hoover to head the new fuel division of the Bureau of Foreign and Domestic Commerce. Mr. Morris, who is a graduate of the Massachusetts Institute of Technology, has been connected with government activities since 1917.

D. McFarlan Moore, who has been elected a vice-president of the Illuminating Engineering Society, has been prominent in electrical circles for a number of years. He was one of Edison's sixty-five early assistants. In 1894 he organized his own company and at one time there were over four miles of the unique "Moore Light" long tubes in domestic use. The advent of the

D. McF. MOORE

tungsten lamp resulted in Mr. Moore's activities being absorbed by the General Electric Company. Mr. Moore is a fellow of the A. I. E. E. and has served on other technical bodies. More than a hundred patents have been granted to him, and at the Rochester convention of the Illuminating Engineering Society, in September, he gave an interesting demonstration of several new forms of electric lamps.

F. H. Sauter has become connected with Gibbs & Hill, consulting engineers, New York, and will be concerned with the development of railroad electrification. He was in the service of the General Electric Company from 1894 to 1903 and has also held positions with the American Locomotive Company of Schenectady, N. Y., including those of designer of steam and electric locomotives. Recently Mr. Sauter has been associate editor of the "Locomotive Dictionary."

C. O. Mailloux, well-known consulting engineer and chairman of the International Electrotechnical Commission, has been invited by the President of France through M. Berthelot, of the Academie des Sciences and chairman of the Ampière centennial committee, to deliver the address of eulogy on Ampière on Nov. 24. The ceremony will take place at the Sorbonne in Paris and will be presided over by President Millerand of the French Republic. Mr. Mailloux has also been asked to act as honorary president of the Internal Conference on Superpower Systems, which will be held during the same week. The expectations are that Mr. Mailloux will sail from New York on Nov. 12 on the S. S. Lafayette.

J. I. Colwell, district manager of the Western Electric Company at Seattle, has been appointed on the industrial bureau of the Seattle Chamber of Commerce, which is making a survey of industrial opportunities in the Puget Sound district.

Bruno H. Ahlers has been appointed sales representative of the Rockbestos Products Corporation of New Haven, Conn., with offices at 366 Madison Avenue, New York City, and Alvah D. Stein, Boston representative, with offices at 156 Purchase Street, Boston.

J. H. Lobban, who has been appointed chairman of the fixed-capital records committee of the N. E. L. A., is assistant general accountant of the Detroit Edison Company. He has served as vice-chairman of the committee on classification of accounts, reports to commissions and relations with other

J. H. LOBBAN

associations. Mr. Lobban was graduated from the University of Michigan in electrical engineering in the year 1911 and entered the statistical department of the Detroit Edison Company as engineer. Later he was promoted to be property engineer in charge of valuation work, property and construction records.

L. H. Lund has been elected auditor of the Westinghouse Electric International Company, to succeed F. N. Kollock, resigned.

Charles F. Leonard has taken charge of business promotion for Walter N. Polakov & Company, Inc., New York, managerial counsel, and has severed his connection with the American Institute of Weights and Measures, for which he has been acting as technical adviser. Mr. Leonard has become a vice-president of the above company and makes his headquarters at 33 West Forty-second Street, New York.

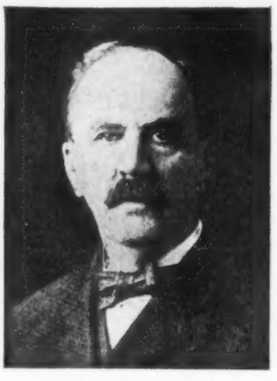
Charles Schneider, formerly superintendent in charge of electrical construction of the Robbins & Myers Company, has been appointed general factory superintendent of the company. Mr. Schneider joined the Robbins & Myers Company in 1898 and wound and assembled with his own hands that year the first power motor ever built by the company. Previous to his employment by the Robbins & Myers Company Mr. Schneider had several years' experience in central-station work.

Obituary

Henry Harvie, who was killed recently in the plant of the Canadian General Electric Company at Peterborough, Ontario, when a large generator burst during an overspeed contest, was well known among hydro-electric engineers in eastern Canada, having been associated with the design and construction of power plants for twenty years. Mr. Harvie was born in England and studied mechanical engineering at London University. In 1900, when about twenty-two years of age, he went to the United States, and in the following year he joined the engineering staff of the Ontario Power Company at Niagara Falls, Ont., where he spent the next seven years. In 1909 Mr. Harvie was engaged by the Algoma Steel Corporation on the construction of a plant on the Michipicoten River to supply power to the company's mines in that district. After the completion of that work, he went to New York, where he spent a few years on the staff of a well-known firm of consulting engineers, returning to Canada in 1915 to join the Ontario Hydro-Electric Power Commission's staff as chief draftsman in the hydraulic department. Early in 1920 Mr. Harvie became hydraulic engineer and designer for the Canadian Ingersoll-Rand Company at Montreal, but this position he relinquished at the end of the year, joining the staff of C. H. & P. H. Mitchell, Toronto.

John B. Crouse, who died at his home in Cleveland on Nov. 6, was one of the pioneers in the manufacture of electric lamps and a persistent advocate of the elimination of competition through co-operation. His broad vision led to the conviction that the bitter warfare between lamp manufacturers in the early days could not continue without sacrificing quality and destroying standards which were essential to progress in the manufacture of lamps. With H. A. Tremaine, F. S. Terry, J. R. Crouse and B. G. Tremaine, Mr. Crouse co-operated in the development of the idea of concentrating the lamp business of the country through the organization of the National Electric Lamp Association. The first step after the organization of this association was the establishing of a mutual engineering department and laboratories in Cleveland, where a personnel was provided for conducting, through co-operative effort, investigations in chemical and physical research, testing, factory inspection and organization, illuminating engineering, technical publicity, business development and sales conferences for the betterment of the lamp business and the benefit of members of the association. One of the great influences of this organization, which has been extended to the present time, was its activity and enterprise in advanced investigations in the field of lighting and illumination. In recent years the publications issued as the result of these researches have been considered the most authoritative available. In all of this work Mr. Crouse took an active interest and lent his support up to the time of his death.

Mr. Crouse was born Nov. 29, 1842, in Hartland, Mich., and at an early age became connected with the milling business. Later he became associated with H. A. Tremaine, an association which continued throughout his career. In the early eighties Messrs. Crouse and Tremaine established the Cleveland Carbon Company, which was later merged with the Bolton & Crystal Carbon Company, forming the Standard Carbon Company. Later the controlling interests in the latter company were sold to the National Carbon Company. Messrs. Crouse and Tremaine then went to Fostoria, Ohio, where they conducted the Crouse & Tremaine Carbon Company. Later they sold their interest to the National Carbon Company and, together with B. G. Tremaine, R. Crocker and Ira Cadwalder, organized the Seneca Baking Company at Fostoria and the Fostoria Incandescent Lamp Company, with Mr. Crouse president of the latter. This group then purchased the



J. B. CROUSE

Fostoria Bulb & Bottle Company, changing its name to the Fostoria Glass Specialty Company and using the factory largely for the incandescent-lamp business. While engaged in this work the idea of the National Electric Lamp Association was conceived, and Mr. Crouse devoted to it his whole-hearted attention. Of late the work of Mr. Crouse in promoting co-operation in the electrical industry has been taken up by his son, **J. Robert Crouse**, who has been associated with and a partner in his father's business since his graduation from college in 1897.

Winthrop G. Bushnell, who for thirty years had been active in the development of public utilities, particularly in Connecticut, died suddenly of heart disease on Oct. 23. He was graduated from Yale in 1888 and a little later entered the commercial department of the United Edison Manufacturing Company. This company was afterward merged with the General Electric Company, Mr. Bushnell remaining with the latter until 1906 and acquiring much knowledge along electrical engineering lines. About 1905 he bought the Falls Village Water Power Company, merging it into the Connecticut Power Company, together with the New London Gas & Electric Company. Under the guidance of Stone & Webster the Connecticut Power Company, of which Mr. Bushnell became vice-president, grew until today it supplies twelve Connecticut cities and towns with electricity.

Trade and Market Conditions

Business Reviews, Together with Market Letters from Important Trade Centers, on the Supply, Demand and Prevailing Prices of Electrical Apparatus and Supplies

Spotty Collections Rule in New England

COLLECTIONS in New England electrical circles are still slow, according to leading jobbers. Settlements are being made anywhere between sixty and ninety days, and the improvement noted in merchandise sales since summer has not yet extended perceptibly to credit departments. Underlying financial conditions are unquestionably better, and business is gradually recovering in most lines of manufacture and distribution. Some jobbers report that contractor-dealers of moderate size are paying their bills more promptly than the larger houses. The stronger central stations are discounting their bills, and the large industrial buyers are doing better. Municipal plants are meeting their obligations very slowly, pending tax levies. Heavy business is yet to materialize in the construction field, but on the whole a gradual improvement is expected.

English Electrical Industry Hoping to Increase Exports to Canada

FIGURES recently laid before the parliamentary fuel committee by the Water-Power Branch of the Canadian Department of the Interior are interesting in showing how completely the United States has dominated Canadian electrical imports during the fiscal years 1919-1920 and 1920-1921. According to these statistics, the United States shipped into Canada during the fiscal year of 1919-1920 a total of $7,311,499 worth of electrical equipment and machinery against $88,981 worth from the United Kingdom and $34,759 from all other countries. In 1920-1921 the proportion was almost the same, imports from this country being $7,296,540, from the United Kingdom $313,344, and from all other sources $23,541. How imports from the United States were divided may be seen in Table I.

That this important export market may be in danger is pointed out by no less an authority than *Electrical Industries* of London. According to that paper, English electrical manufacturers are looking hopefully forward to increasing the total of their exports to Canada and are depending on the exchange situation which is likely to develop as a result of the passing of the emergency tariff by congress. English manufacturers feel that this situation is exceedingly favorable to them and strongly prejudicial to American firms seeking trade in Canada.

In addition to this, the opinion is held that the recent decision of the Canadian Customs Department to add the exchange margin to the face value of American invoices when valuing goods for duty should set a large number of wholesalers in Canada to seeking an alternative source of supply.

TABLE I—IMPORTS FROM UNITED STATES DURING FISCAL YEARS 1919-1920 AND 1920-1921

	1919–1920	1920–1921
Batteries	$222,243	$153,924
Cooking and heating appliances	111,148	123,627
Dynamos and generators	1,039,067	1,227,398
Lighting fixtures	698,879	650,548
Meters	243,252	352,348
Lamps, arc	9,719	28,669
Lamps, incandescent	1,153,407	970,163
Motors	1,956,639	2,578,807
Sockets	138,312	300,935
Telegraph, telephone and wireless apparatus	754,179	966,084
Transformers	123,118	167,427
Total	$7,311,499	$7,296,540

That the Canadian market for electrical material will grow largely in importance during the next few years can be seen from the report of the Water-Power Branch. At the beginning of 1920 there were developed 2,417,896 hp. in hydro-electric plants with another 650,000 hp. under construction. Figures are not available on the amount under construction in the beginning of 1921. Numerous rural-distribution lines are being planned, according to the report, as is also the construction of several hundred miles of light radial railways.

TABLE II—PRODUCTION OF ELECTRICAL SUPPLIES AND EQUIPMENT IN CANADA, DURING THE FISCAL YEAR 1920–21

Classes of Products	Selling Value at Factory
Dynamos, generators, etc	1,804,687
Transformers	1,502,261
Switchboards, panelboards and cabinets	1,011,837
Motors, all kinds	1,692,823
Storage batteries	561,974
Primary batteries	1,767,094
Parts and supplies:	
Dynamos and generators, etc	152,877
Motors	368,950
Storage batteries	115,136
Carbons	1,243,631
Incandescent lights	2,424,720
Sockets, receptacles, bases, etc	769,582
Electric lighting fixtures	1,248,640
Telegraph apparatus	15,677
Telephone apparatus	1,835,979
Insulated wires and cables	8,536,126
Electric stoves and heaters	1,009,353
Electric irons and fans	453,085
Fuses	313,550
All other electrical apparatus and supplies	5,009,514
All other products, including repair work	2,350,382
Total	$34,187,658

A glance at the total yearly production of electrical materials in Canada is sufficient to show that much of the supplies for these improvements must be imported, and this applies not only to materials and equipment for generation and transmission but to household appliances also.

Improving Outlook for Schedule Material Production and Sales

WITH but one or two exceptions, manufacturers of schedule material interviewed recently by a representative of the ELECTRICAL WORLD point to a continuing improvement in demand for this class of supplies. Within the past two months substantial progress has been made in converting raw material purchased at former high price levels into finished products covered by actual orders from distributers. Thus one considerable obstacle to the resumption of buying by switch and socket makers has been minimized, and in a striking instance, raw material is now being purchased at the value of $20,000 in a given period compared with about $1,000 but a comparatively few weeks back. Doubtless it will be some months more before the heavy stocks of raw material on hand in this or that manufacturer's plant since war-time orders were a factor in the market are completely liquidated, but the proportion of new material coming in is rapidly increasing, and with this condition is coming about a greater stabilization in production costs and prices.

Wages have been slowly going down in comparison with war-time scales, defining these as the total compensation of employees within a stated period. One leading manufacturer stated that further reductions must be established before good business can be enjoyed and pointed out that

better work is being performed by new employees. Additions to the payrolls have been made in other plants also, and one manufacturer now utilizes 700 employees as against about 350 on Sept. 1. It is noted in more than one plant that the efficiency of labor is decidedly better than a year or two ago. The continuance of very high wages in the building industry, one manufacturer holds, is retarding the expansion of switch and socket production in different sections of the country where such products are fabricated.

The volume of business now being handled by representative concerns was declared to have reached from 60 to 75 per cent of the 1920 peak. Notwithstanding the slow revival of building, enough new construction is being done in scattered fields to make a decided impression on the demand for schedule materials. Foreign trade in this line is still dull, but it is believed that the high quality of American products will be more and more recognized in other lands, and that a gradual increase in shipments is to be expected where the necessary credits can be granted. Jobbers are buying more frequently and in larger volume, as regards domestic business. As the electrical appliance trade improves, the demand for plugs and switches is bound to increase perceptibly over the present fairly good totals.

Good Holiday Trade Expected

OPINIONS of jobbers and dealers throughout the country are divided on the subject of the volume of holiday trade to be expected this fall. The amount to be done is given at anywhere from 75 per cent to 125 per cent of last year's business, the majority, however, seeming to feel they would be satisfied with a volume equal to last year's. In several localities dealers and jobbers are said to have considerable carry-overs from last year, and this will tend to cut down orders to manufacturers. Always, however, there remains the chance that there will be a rush of buying at the last moment that will bring up sales to the desired level, though at the present time dealers in only a few sections of the country seem to show any desire to place orders. Most jobbers, however, are going ahead with confidence and stocking up.

New York jobbers say they are placing orders for the holiday trade, and manufacturers are urging dealers to provide for their requirements as early as possible to avoid a last minute shortage. Estimates of the probable volume of Christmas business in the East this year vary considerably because of price reductions which have been made during the year, stocks carried over and the hesitancy on the part of dealers to put in new stocks. Indications are that jobbers and dealers will do from 75 to 80 per cent of the business, in dollars, that they did last year. Manufacturers' business will probably be slightly under this figure.

Chicago Christmas trade in electrical appliances this year will vary anywhere from 60 to 100 per cent of the 1920 business, according to the opinions of dealers and jobbers interviewed by a representative of ELECTRICAL WORLD. Very few dealers have had any Christmas stock left over from 1920 so that they are buying now. One dealer is expecting a better sale of small appliances than of the larger equipment, such as washers and vacuum cleaners. The majority of dealers feel that most of the Christmas retail buying will come in a rush just before Christmas. This occurred last year and brought what had started out as a dull holiday season to an unusually successful end.

A holiday trade equal to last year's and in some cases surpassing it by at least 25 per cent is anticipated by New England jobbers. General buying from manufacturers for this trade has been in progress for some time, carry-over stocks amounting to little or nothing. A shortage of a leading make of hollow ware is already being encountered, and new orders for delivery from the factories before Christmas must be placed promptly if they are to be filled in time by other representative manufacturers. This year's stocks are more diversified than last year's accumulations. Few electrical toys were carried over, and the demand for flatirons, toasters and percolators overtops the call for other appliances.

Jobbers in the Southeast, according to a recent report, are beginning to accumulate their goods for holiday trade on the basis that there will be approximately 75 per cent of last year's business in the portable line and 80 per cent in the toy line. Orders on manufacturers for toys, however, will be only 50 per cent of last year as jobbers there had heavy carry-overs in this specialty.

Holiday purchasing is commanding the interest of jobbers in St. Louis. It is the general expectation there that the business done this year will equal and possibly exceed that of last year. The reduced prices have resulted in more liberal buying by the public, and trade conditions here are better than they were in November and December of last year. Dealers have placed but a small portion of their orders, but jobbers are laying in their stocks. During the year stocks in the hands of both dealers and jobbers were substantially reduced, so that almost all of the demand for this season will pass through their hands and to the manufacturers. It is expected that the principal demand will be for heating appliances, especially flatirons and toasters. Some difficulty is being experienced in getting a satisfactory supply of irons and also of curling irons.

Inquiries are coming in for holiday goods on the Pacific Coast, but not many sales are being made at the present time. Jobbers in general are anticipating that the holiday trade will approximately equal that of last year. Jobbers held over considerable stock, in some cases practically the entire stock that will be needed for this year's demands. What new orders have been placed by jobbers were placed on the basis of last year's sales. Dealers are anticipating that the holiday business will range anywhere from 70 per cent of last year's sales to from 15 to 25 per cent greater than last year. Many dealers carried over a considerable amount of stock from last year and probably will not do much reordering until this has been moved.

Metal Market Situation

SALES of copper in October were considerably in excess of estimates, some of which put October under September. The official figures on sales were 140,000,000 lb., compared with 97,000,000 lb. in September. Output in October was unchanged from the previous month, amounting to 40,000,000 lb. This means a decrease of 100,000,000 lb. in the surplus of copper.

During the first week in November price was an uncertain quantity. Some of the producers were reported to be shading 13 cents, others stuck to 13¼ cents, and some met 13-cent competition. The publication of the sales figures for October bolstered the market, however, and producers are declining to quote under 13¼ cents for the rest of the year. During the week it became known that a large utility had covered its needs for some time, and this has made many feel that the utilities are confident of a steadily rising copper market. Export movement for the year to date is behind 1920.

NEW YORK METAL MARKET PRICES

	Oct. 31, 1921	Nov. 7, 1921
Copper	£ s d	£ s d
London, standard spot	66 5 0	66 0 0
	Cents per Pound	Cents per Pound
Prime Lake	13.00	13.00—13.25
Electrolytic	12.75	12.00
Casting	12.37½	12.37½
Wire base	14.50	14.50
Lead, Am. S. & R. Co. price	4.70	4.70
Antimony	4.80	4.70
Nickel, ingot	41.00	41.00
Sheet zinc, f. o. b. smelter	10.00	10.00
Zinc, spot	5.05—5.10	5.20—5.25
Tin, Straits	28.12½	28.62½
Aluminum, 98 to 99 per cent	24.50	24.50

OLD METALS

	Cents per Pound	Cents per Pound
Heavy copper and wire	10.50 —10.75	10.50 —10.87½
Brass, heavy	5.00 — 5.25	5.00 — 5.25
Brass, light	4.75 — 4.87½	4.75 — 4.87½
Lead, heavy	3.75 — 4.00	3.75 — 4.12½
Zinc, old scrap	2.25 — 2.50	2.00 — 2.25

THE WEEK
IN TRADE

Prices When Quoted Are Those Prevailing at the Opening of Business on Monday of This Week for Points West of the Mississippi River and on Tuesday for All Eastern Points

NOVEMBER has started well in electrical lines, with demand good for many items, some shortages, and with the price trend seemingly deflected from the downward path to the level. New York jobbers report numerous orders for more than ordinary quantities, and as they have let their stocks run low on a number of lines, there is a good movement from manufacturer to consumer. Chicago manufacturers and jobbers are expecting a constantly increasing business until the first of the year. There is a considerably improved sign business noted there. St. Louis sales to contractor-dealers are very good, and a shortage in ½-in. black iron conduit is reported there. Atlanta jobbers have had an exceptionally good movement of farm-lighting plants, as a result of higher cotton prices.

Electrical contracts in New England have shown activity, and this, coupled with better motor sales, is a cause for optimism on the part of jobbers. On the Pacific coast and in the Intermountain region there is a great deal of construction, and jobbers are moving their stocks better than in the summer and early fall. A reduction of 10 per cent in pole line hardware took effect Nov. 3 and is expected to stimulate demand for that article.

NEW YORK

November promises to be a still better month for the electrical trade than was October, according to jobbers' comments on the nature of last week's business. This month started off with more activity in all lines, and orders have been for somewhat larger quantities. Close, hand-to-mouth buying of wiring supplies is gradually giving way to purchases which will build up dealers' stocks. Few jobbers are carrying any large stocks, and there is a much better movement of material from manufacturer to jobber and jobber to dealer. There is a shortage of flexible armored conductor, and some jobbers have been unable to fill orders immediately because of delayed shipments from the manufacturer.

Heating appliances and household devices are moving better and orders for holiday stocks are beginning to make a definite showing.

Conduit.—Trade is a little more active, but so far there has been no tendency toward large orders. The following prices were quoted this week: For ½-in. black pipe in 2,500-ft. lots, $48.29 to $50.83; ¾-in., $62.06 to $65.32, and 1-in., $88.51 to $93.16 per 1,000 ft. Galvanized pipe in the same sizes was quoted at $53.19 to $55.93, $68.61 to $72.22 and $98.19 to $103.36. Jobbers' stocks are ample in the above sizes but stock in larger sizes is rather low.

Rubber-Covered Wire.—No change has been noted in the conditions of the wire market during the week. Demand is moderate and prices remain as last quoted. No. 14 rubber-covered sells at $6.50 to $6.60 per 1,000 ft. in 5,000-ft. lots. Stocks generally are good.

Flexible Armored Conductor.—The active demand for this material has completely exhausted some jobbers' stocks, and one leading manufacturer is reported to be from 2,000,000 ft. to 3,000,000 ft. behind with his orders. No. 14, two-wire, single-strip, is quoted this week at $44.50 to $46 per 1,000 ft. in lots of that quantity. Double-strip is quoted at $46.50 to $48 per 1,000 ft.

Lamp Cord.—Jobbers report a fair demand for No. 18 cotton, twisted, which sells for $11.22 to $12.90 per 1,000 ft. Parallel cord in the same size is quoted at $14.96 to $15.60 per 1,000 ft. Stocks are ample to meet the present demand.

Loom.—There is only a very moderate demand for this material and stocks are small. The 7/32-in. size is quoted at $16.50 to $17.33 per 1,000 ft. and the ¼-in. size is quoted at $18 to $18.90 per 1,000 ft. in lots of that quantity.

Metal Molding.—This material is in fair demand, stocks, however, being kept small. The three-wire size remains at $5.60 per 1,000 ft.

Tape.—Friction and rubber tape is in fairly active demand and stocks are good. Both are quoted at 36 cents per pound in 100-lb. lots.

Heating Appliances.—Jobbers who specialize in household devices report that the demand is increasing and dealers are ordering for holiday requirements. On some makes of flatirons and curling irons there is still a shortage, but manufacturers are promising deliveries in ten days to two weeks.

CHICAGO

A strengthened copper market was the principal event of the week, but it has not hampered the suburban building industry, because jobbers report brisk trade on flexible armored conductor. In general, the trade this week has been good on most lines, especially on portable lamps and ironers. Jobbers and dealers are gaining confidence, and they express the opinion that trade for the remaining year will improve each week.

Pole-line hardware has been reduced about 7½ to 10 per cent, but prices on poles and cross-arms still stand the same. Price changes on conduit have been reported by some jobbers while others report no change. Meters for central stations in the Middle West are reported selling well.

Wire.—Movement on rubber-covered No. 14 has been good this week, and it is selling for $6.75 per 1,000 ft. in 5,000-ft. lots. Weatherproof went up to 16½ cents a pound in 1,000-lb. lots, and jobbers report a fair market with ample stocks to fill the orders. The bare wire base also has advanced to 16½ cents.

Flexible Armored Conductor.—This material has increased in price along with the rise in copper, and No. 14 single-strip, two-wire sells for $50 per 1,000 ft. in 5,000-ft. lots. The No. 14 double-strip, two-wire conductor sells for $52.50 per 1,000 ft. in 5,000-ft. lots. The demand is very active, and stocks in some cases are just even with the orders.

Conduit.—The new discount of 5 per cent has been reported by some dealers. The prices for black pipe in 5,000-ft. lots per 1,000 ft. are as follows: ½-in., $46.55 to $48; ¾-in., $59.72 to $62, and 1-in., $85.05 to $90. Galvanized pipe for the same quantity in the same respective sizes sells for $51.39 to $53, $66.26 to $70 and $94.72 to $100. Sales have been fair to good and stocks are ample.

Heating Appliances.—Jobbers report all lines of appliances moving well, but principally ironers and portable stoves. With a few exceptions the stocks of most jobbers are heavy enough to supply the trade.

Tape.—Tape has not changed in price, but the market is still moving fairly well. Rubber tape sells for 40 cents a pound, while cotton tape sells for 38 cents a pound, both in 100-lb. lots. Stocks are ample.

Portable Lamps.—Several jobbers report very active inquiries on portable reading lamps and also report some good sales on this line. Stocks are sufficient for the trade.

High-Tension Equipment.—Numerous inquiries on high-tension equipment for irrigation purposes in the West are reported by one manufacturer. This company also reports a sale of a 3,600-kw. outdoor substation in the eastern Pennsylvania coal mine district. Other manufacturers report business better than last week because of the removal of the railroad strike threat.

Pole-Line Hardware.—A general price reduction of between 7½ and 10 per cent has been reported on this material by several large jobbers. This equipment is moving fairly well, and jobbers have ample stocks for trade.

Meters.—One dealer reports a brisk trade on this material for central stations in the Middle West. Another dealer reports an upward trend on sales of meters for every month since July.

BOSTON

Business activity is well sustained in electrical lines, barring the development of large projects in the construction field. Industrial activities in New England are generally reflecting better sentiment in trade, and building operations are picking up somewhat outside of Boston. Prices were easier at the week end on pole line hardware and rigid conduit.

Considerable buying interest was reported from last week's textile show at Boston along electrical lines, industrial electric truck and motor sales showing more life than of late. Jobbers are still buying on a moderate scale, though less hesitation is apparent than a few weeks ago. Stocks are spotty and certain appliances are in strong demand, making deliveries a little longer than earlier in the season. Non-employment is diminishing slowly. The labor situation is somewhat unsettled here and there, but in electrical circles conditions appear fairly tranquil.

Wire.—Prices remained relatively firm last week, but an early advance is expected in rubber-covered wire, at least in some quarters. In 5,000-ft. lots No. 14 sells around $6.25 per 1,000 ft. Weatherproof base is 16 cents, with a little better movement. Bare base, at 15½ cents, is unaccompanied by much activity.

Lamps.—Trade is better in this line than in many other branches. There is a very healthy seasonal demand this year, and popular interest in artistic illumination is more evident than for some time. Industrial lighting is also receiving widespread attention. No shortages are reported in the usual sizes of lamps, and deliveries are excellent in this territory.

Pole-Line Hardware.—A revived interest in this class of material was apparent at the close of the week, and a price reduction of the order of 10 per cent was announced effective Nov. 3. Central-station buying has picked up somewhat. A few representative prices from jobbers' sheets are as follows: Cross-arm braces, 1⅞-in. x 4½-in. x 28-in., per 100 pieces, order of $50 to $100 net value, $11.22; galvanized carriage bolts, less $50 net value, 4½-in. x ⅝-in., $2.23 per 100; galvanized lag screws, less than $50, ½-in. x 4-in., $2.81 per 100; machine bolts, ⅝-in. x 10 in., under $50, $9.07 per 100; galvanized thimbles, ½-in., under $50, $5.76 per 100.

Flexible Armored Conductor.—No. 14 double-strip stiffened last week to $47.50 per 1,000 ft. in 5,000-ft. lots, single strip remaining at $45. Trade is not very vigorous, but routine requirements are yielding a fair volume of small business.

Loom.—Recent price movements appear to have dulled the edge of demand somewhat. So far the increased cost of cotton has had little effect on quotations for this material, which is readily obtainable in quantity. Some complaint is heard that present prices are unprofitable to the trade. In 1,000-ft. lots the quotation Saturday was $17.50 on ½-in. loom.

Porcelain.—Shipments of "Nail-it" knobs have reduced the shortage mentioned last week to nominal proportions. These are selling around $18.50 per 1,000 in barrel lots, and the demand is fairly good.

Sockets.—These moved briskly last week. In case lots, pulls sell around 31½ cents net.

ATLANTA

Reports from all over the section indicate considerable improvement, though some of the banks and mercantile establishments report disappointment that the liquidation of cotton and other agricultural paper has not been made with the rapidity that was anticipated. This is causing some little delay in readjustment, especially in central and south Georgia, where the cotton yield this year was most unsatisfactory. In north and northeast Georgia, however, the crop approximated normal, and a trip through the principal cities this week shows business to be well on the road to normal conditions.

The report of the Sixth Federal Reserve District shows improvement in the volume of business done in wholesale grocery, dry goods, hardware, shoe and furniture lines, this increase varying from 6 per cent increase in grocery to 35 per cent in the shoe line. The acute housing shortage is continuing to hold up building activities, with the result that October permits for Atlanta amounted to $1,074,000, while other centers in this district show somewhat similar activity. A number of steel mills in Birmingham have reopened for business, while plants that were already operating are increasing production. Reports are that cement mills are operating to capacity, while iron pipe, clay pipe and brick plants are on a 70 per cent basis with business on the increase. Reports from Florida indicate considerable activity in the building line in anticipaton of the winter tourist trade.

Pole-Line Hardware.—A price reduction of 10 per cent is effective this week in the face of a brisk demand for all articles in this line. Stocks are reported in fair to good condition with factory shipments satisfactory.

Safety Switches.—The new low-priced switch recently introduced is beginning to make itself felt in the safety switch line, though jobbers are not making special efforts to push this particular size. Other sizes continue in popularity, the two-pole and three-pole 30-amp. being most in demand. Stocks are in good shape.

Farm-Lighting Outfits.—Business in this specialty is the best for many months, one of the largest dealers reporting that improved conditions in rural districts is most noticeable in this line. The demand is mostly for the small to medium-size outfits.

Air Heaters.—This line has again become dormant after the flurry of three weeks ago, despite efforts of dealers to move their stocks through the medium of reduced prices. Very few of the new-style heaters are being ordered as a large portion of last year's stocks still remain unsold.

Starting and Lighting Batteries.—Approaching winter, together with better conditions in rural districts, is responsible for an increase in the volume of business being done in this line.

Interphones.—Apartment-house construction is taking a fair to good volume of the moderate-priced installations. Jobbers report a slightly increased activity during the past sixty days, with prices steady.

Panelboards.—Sales in this line are quite satisfactory, one jobber reporting his business approximately $20,000 ahead of last year's. Sizes range from four-circuit to fifty-circuit sizes, though the twelve-circuit to fourteen-circuit size is by far the most popular. Shipments are satisfactory.

Poles.—Maintenance and replacement work is responsible for heavy pole purchases throughout the district. Chestnut and cypress varieties lead in the volume of sales, with cypress particularly popular. Pole yard stocks are in first class shape with better quality available.

Lamps.—The usual fall buying is under way, and as far as can be ascertained no unusual stimulus resulted from the recent price reductions. The Type C lamp in 40-watt and 60-watt sizes continues the most popular.

ST. LOUIS

Conditions continue to show gradual improvement, as is shown by the fact that the so-called "bread-and-butter" materials are being sold to contractors and dealers in more liberal amounts. The low prices which have prevailed, especially in wire and porcelain, have resulted in their carrying heavier stocks, and also small residential wiring jobs are more numerous. More confidence is felt in the stability of the present prices.

Business in the South is showing improvement. For a time it did not pay to have men cover the territory, but all of the larger jobbers are now actively soliciting business there. Sales are evenly distributed over various lines, except for industrial goods.

Fuses.—Plug fuses are finding excellent demand and stocks have a tendency to be low. Cartridge fuses are moving slowly. A clear-window plug fuse is priced at $31.50 per 1,000 in lots of 1,000 or more. N. E. C. non-renewable cartridges, 3 amp. to 30 amp., sell for $9.60 per 100 in standard packages, and 31 amp. to 60 amp. sell for $14.40 per 100.

Sockets.—Fairly good demand obtains, principally for house wiring, and stocks are on a satisfactory basis. In lots of 500, keys are quoted at $18.15 per 100, keyless at $16.50 and pull at $33. Contractor-dealer stocks are low.

Conduit.—There is a shortage of ½-in. black, on which sales have been particularly good the past week, but satisfactory stocks of other sizes are on hand. Representative prices are: ½-in. black, $47.30; ½-in. galvanized, $53.20; ¾-in. black, $62; ¾-in. galvanized, $68.60 per 1,000 ft.

Flexible Armored Conductor.—Slightly higher prices prevail, No. 14, 2-wire, double-strip being priced at $52.50 per 1,000 ft. in 5,000-ft. lots. Stocks are in good condition, but the market is weak.

Outlet Boxes.—The following discounts from list have been established for lots of 100 to 1,000: black, 60 per cent; galvanized, 55 per cent. The 3½-in. round box sells for $7.20 in the black and for $8 in the galvanized. The demand is not active.

Metal Molding.—Jobbers are finding molding hard to obtain and stocks are getting low. The demand has shown substantial improvement. The three-wire size is quoted around $5.70 per 100 ft.

Pliers.—The demand has been quiet for several weeks, and stocks, while low, are complete. The 6-in. side-cutting Klein plier is priced at $2.80 and the 8-in. at $3.75.

Wire.—A good and steady demand is found for No. 14 rubber-covered, which is selling for $6.50 per 1,000 ft. in 5,000-ft. lots. Stocks are being maintained but are getting low. The larger sizes of rubber-covered are inactive. A falling off in the demand for weatherproof was felt last week. The base on both bare and weatherproof remains around 16 cents per pound.

Lamp Cord.—Increased sales for the week were reported, almost entirely in the cotton-covered, though there was a slight improvement in the call for silk. Stocks are reasonably good. Cotton-covered is selling for $13.25 per 1,000 ft. and silk-covered for $27 per 1,000 ft., both in size No. 18 and in lots of 1,000 ft.

SAN FRANCISCO

The report of building permits for October shows a marked increase over October, 1920. The figures follow: October, 1921, San Francisco, $2,498,523; Los Angeles, $9,781,394; Oakland, $1,245,220. The corresponding figures for October, 1920, were: San Francisco, $1,890,530; Los Angeles, $6,431,661; Oakland, $520,717. San Francisco shows somewhat more than its normal rate of increase, but Los Angeles is particularly noteworthy in running far ahead of even last year's extraordinary record. It is predicted that Los Angeles will achieve a total of close to $80,000,000 for the entire year.

Boxes.—Single boxes in the 2½-in. size are now selling for about 11 cents each in lots of 100. There is a consistent demand, but it is far below last year's sale.

Boxes and Covers.—The present standard-package lots take these discounts: Galvanized, 40 and 10 per cent; in 1,000 lots, in packages, 42½ and 10 per cent. Stocks are rather large and the call rather light just now save in the Southern District.

Ranges.—There has been a very good demand for the new-type ranges, especially in the open-coil units, and reorders were sent to the factory within two weeks of receipt of Coast stock, the most popular type being the four-coil top with side oven and warming compartment.

Batteries.—The dry-cell line, despite new substitutions, such as bell-ringing transformers and new ignition specialties, still holds its own and finds steady sale. The greater publicity given flashlights and the educational campaign to keep them properly renewed has made a good business for 1921.

SEATTLE—PORTLAND—SPOKANE

Business conditions in general are good, and the prevailing state of mind among merchants and business men generally continues to be optimistic. The upward trend which set in two months ago has been well maintained to date, although in the Puget Sound region there are signs of a tendency for the curve to flatten out to a new fixed level. The export business of Portland is the largest in the history of the city.

Building permits so far this year for Portland are nearly 200 per cent greater than for 1920. This heavy building program is manifesting itself in increased sales of wiring materials and greater volume of business for the contractors.

The reduction of freight rates recently ordered by the Transcontinental Freight Bureau on several hundred items of merchandise is a matter of importance to the Northwest, since this will help to bring to the Northwest ports much business which they previously enjoyed but which has sought other routes since the last tariff increases. This is particularly true of steel rails and other steel products. A large electrically driven sawmill will be built at Astoria, Ore., soon and the town of McMinnville, Ore., plans the construction of a 6,000-hp. hydro-electric municipal plant soon.

In the electrical supply business jobbers report greater activity in the industry than at any time during the past year, although in some sections there was a slight slowing down during the past week. Portland jobbers report demand for heaters and ranges active, with seven car loads of ranges placed on order during the past week. In Seattle business consists largely of lighting equipment, lamps and fixtures, farm lighting and pumping plants and domestic appliances. The only price change of note during the past week was a 5 to 6 per cent drop in watt-hour meters.

Electrical dealers and contractors of Portland report wiring in small jobs to be exceptionally good at the present time, store sales good and fixtures somewhat less active than for the past few weeks. While prices received for goods are lower than last year, the volume is reported greater, which indicates considerable activity in actual sales.

Electrical construction for the month of October exceeded anything in the history of Portland. Portland quotes as follows on knobs, cleats and tubes: "Nail-it" knobs, unit packages, $26.40 per 1,000; standard packages, $24 per 1,000; two-wire unglazed cleats, unit packages, $23.30 per 1,000; standard packages, $22.20 per 1,000; tubes, ⅜-in. x 3-in., unit packages, $9.05 per 1,000; standard packages, $8.60 per 1,000.

SALT LAKE CITY—DENVER

Continued mild and fair weather is a great stimulus to late fall building. Except for a week of storms the Intermountain region has enjoyed an autumn phenomenal for sunshine and moderate temperature. Scores of homes are being fully completed that builders had expected would be held up on account of inclement weather. There are scarcely any large construction jobs now under way and few are projected for spring.

Retail business has not been brisk during the past week. Aggressive advertising is necessary to keep business from lapsing into a state of lethargy. The mild weather is considered one of the prime causes of the tendency to inactivity. The first storm, it is believed, will bring the purchases out in goodly numbers. The live-stock industry is in much better shape than it has been for a long time. Credit is now available to all responsible growers, feed is cheap and forced liquidations of a disastrous nature are now a thing of the past.

The sugar industry is making a hard fight for its life. The outlook, however, is far more encouraging than it has been for some months. Farmers are being paid for their beet crop as per contract schedule and are in a position to make necessary fall purchases. The electrical trade reports steady improvement, with sales picking up at a slow pace. Jobbers are moving their stocks at a better rate than during the summer and early fall months.

Manufacturers' Activities

Devoted to the Business Side of Manufacturing, Distribution and Sales, News from Jobbers and Foreign Fields and a Record of New Devices and Trade Literature

Woodrow Reports Washing Machine Sales Better

October proved to be the largest month in point of production and sales that the Woodrow Manufacturing Company, washing-machine manufacturer, Newton, Iowa, has had since the first of the year, according to Charles M. Brown, sales manager of the company. Mr. Brown stated that on account of the numerous orders which had been received in October the company has become considerably behind in delivery. He continued to the effect that it was apparent that people are not buying entirely on a price basis at this time, as the Woodrow company has made only two reductions this year and does not contemplate another. The washing-machine market is considerably nearer stabilization at the present time than was the case last summer, he said, and the expectation of the Woodrow company is that a gradual improvement will continue.

St. Louis G. E. Lamp Factory Completion Postponed

The Missouri Glass Division of the National Lamp Works of General Electric Company has postponed for about a year the completion of its St. Louis factory. The demand for lamps is low because of the diminished industrial activity throughout the country, there is about three months stock of glass on hand, and the Eastern plants of the National Lamp Works can supply all the bulbs now necessary. The building is completed and a small portion of the equipment has been installed.

Habirshaw Finds Good Code Wire Demand

The output of the Habirshaw Electric Cable Company has been increased to 45,000,000 ft. of wire per month at its Bridgeport plant by the addition of a night force there. The Bridgeport plant is now running to full capacity, and the company hopes to be able to continue the operation of the plant at this rate for some time to come. Officials do not look for any phenomenal increase in business, but find that at the present time there is a heavy demand for small sizes of code and telephone wire.

Chicago Pneumatic Alleges Patent Infringement

Suit has been instituted by the Chicago Pneumatic Tool Company in the United States District Court in the western district of Michigan against the Keller Pneumatic Tool Company for injunction and accounting of profit and damages due to alleged infringement of certain United States patents covering power hammers. The patents alleged to be infringed are Nos. 879,106, 897,958, 1,029,082 and 1,126,096.

Suit also has been brought against the H. Channon Company in the United States District Court in Chicago for alleged infringement by sale and offering for sale of the power hammers manufactured by the Keller Company and for alleged unfair competition by acts calculated to produce confusion in the trade. Two previous suits filed by the Chicago Pneumatic Tool Company against the Keller Pneumatic Tool Company for alleged infringement of patents are now pending. One is for alleged infringement of patents 730,887, 822,146, 866,573 and 917,242. The other action is for alleged infringement by the use of the trade name "Keller" and certain other trade marks of the Chicago Pneumatic Tool Company.

Gainaday Goes Into Production of Cleaners

The Pittsburgh Gage & Supply Company, manufacturer of electrical household appliances, has announced its entrance into the electric suction cleaner field. The new product is being sold under the trade name of "Gainaday" and is being distributed through branches already established, numbering thirteen, and also through fifty-two previously established agencies, which handle products of the company only.

Appleton Company Not Interested in Anderson

An item on page 853 of the Oct. 22 issue of the ELECTRICAL WORLD dealing with a change in the control of the Anderson Electric & Equipment Company gave the impression in its headline that the Appleton Electric Company was interested. Officials deny any company interest in the transactions, and this statement is made to correct any idea that the Appleton company is interested in the changes.

Tacoma Manufacturer Producing Electric Appliances

The Western Foundry & Furnace Company, 3002 South Chandler Street, Tacoma, Wash., has announced that it has started production of electric household appliances. At the present time the company has on the market an electric heater, and production of an electric clothes drier will start in the near future. The company has been manufacturing furnaces in Tacoma for the past ten years, but only recently has the manufacture of electric appliances been attempted. A short time ago the company was reorganized and the capital stock was increased from $29,000 to $50,000, the management being taken over by J. W. Wright, now vice-president. A. Z. Love is president and A. R. Chastain, formerly manager of the Johns-Manville offices in Vancouver, B. C., was named as secretary-treasurer.

Brass Goods Manufacturer Now Publishing Net Prices

The H. B. Sherman Manufacturing Company, Battle Creek, Mich., manufacturer of brass goods, has announced its adoption of the plan of publishing net prices instead of list and discount. The present system has been in use only three months, the latest bulletin—price sheet No. 14—being dated Aug. 1. The new method involved an elaborate change on the part of the company, inasmuch as it had several hundred prices on its sheet, but officials state that it is proving a success and will be continued.

Philadelphia Electrical & Manufacturing Company Enlarges Plant

The Philadelphia Electrical & Manufacturing Company, 1206-1220 North Thirtieth Street, Philadelphia, has acquired the property adjoining the site of its present factory and will use it for expansion purposes. The property is already improved with a one-story building, 62 ft. x 157 ft., and alterations are being made. Not all of the building will be used by the company at the present time, part being reserved for expansion as conditions improve.

Westinghouse Buys Seattle Plant for Assembling

Negotiations leading up to the establishment in Seattle by the Westinghouse Electric & Manufacturing Company of a manufacturing and assembling plant were consummated during the past week when this company purchased the plant of the Kilbourne & Clark Manufacturing Company of Seattle for a reported consideration of $130,000. The plant will be used for the assembling and testing of machinery, manufacturing switch-boards and instrument panels, warehousing of the company's products and the housing of its sales organization. Seattle is the principal distributing center for the Westinghouse products in the Northwest.

Joint Rubber Insulation Committee Disbands

The Joint Rubber Insulation Committee, whose specifications for 30 per cent Hevea rubber insulation are now almost universally used in the purchase of high-grade rubber insulation, has gone out of existence after ten years of service to the electrical industry. On July 15 a sub-committee of the Joint Rubber Insulation Committee passed the following resolution: "Whereas the Joint Rubber Insulation Committee has completed its special work, and whereas its members are no longer in a position to continue its activities and whereas the American Engineering Standards Committee is now the recognized organization for the control of engineering standards, and whereas the constitution of the American Engineering Standards Committee requires that engineering standardization be brought within the influence of that committee through a recognized technical society, such as the American Society for Testing Materials, therefore be it resolved, that the American Society for Testing Materials be requested to assume the responsibility for this work, and be it

resolved, that should the American Society for Testing Materials accept this invitation, it be requested to add to the membership of the committee to which this work will be assigned a suitable number of members of the Joint Rubber Insulation Committee to insure continuity of efforts, and be it resolved, that if this consolidation is effected, the Joint Rubber Insulation Committee shall go out of existence and the secretary shall give due notice to the technical press, to the members of this committee and others, duly interested."

The American Society for Testing Materials acted favorably upon the requests contained in these resolutions at a meeting of its executive committee held Oct. 11, 1921. The work of the Joint Rubber Insulation Committee will be taken over by committee D-11, on rubber products, the chairman of which is F. M. Farmer and the secretary C. D. Martin, 466 Lexington Avenue, New York City.

The history of the work of the Joint Rubber Insulation Committee will be found in the report printed in the *Proceedings* of the A. I. E. E., April, 1917. Reprints of the report may be secured from John Wiley & Son, New York City. It contains specifications for rubber compound and the details of analytical procedures which will determine the amount and quality of rubber.

Whitall Company Changes Name

The name of the Whitall Engineering Company, Waterbury, Conn., has been changed to the Whitall Electric Company. The company manufactures lighting fixtures, household appliances and engineers' and contractors' supplies. P. S. Whitall is in charge.

Washing-Machine Reversing-Clutch Patent Upheld

In reporting the victory of the Conlon Electric Washer Company in its suit against the Brokaw-Eden Company for infringement of its reversing-clutch patent the ELECTRICAL WORLD, in its Oct. 29 issue, referred to this clutch as having been designed to protect washing machines of the "oscillating type." The Conlon company writes that this is incorrect in the present case as the patent in suit had to do with washing machines of the "reversing-cylinder type."

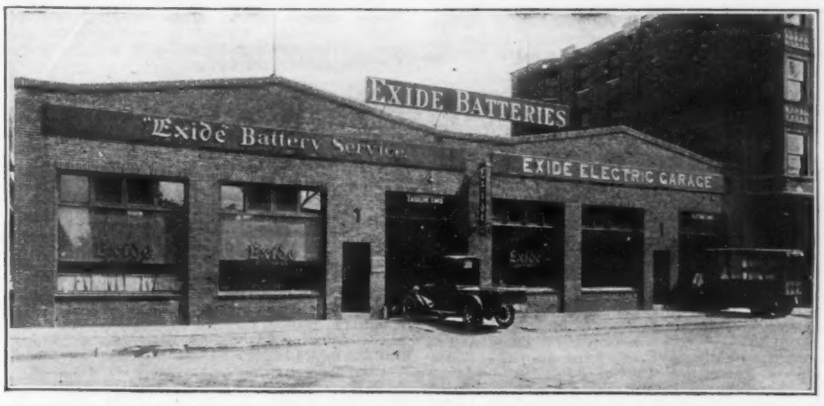
Trumbull Company Declares Present Prices Afford Fine Investment

Another vigorous declaration about the attractiveness of present prices to electrical material buyers appears in the October issue of the *Trumbull Cheer*, the house organ of the Trumbull Electric Manufacturing Company, Plainville, Conn. The company points out that to any careful observer it must be evident that prices on many lines are particularly low and should be very inviting. "When it becomes true," the statement says, "that any given lines are selling for less than they cost to produce, then, indeed, is it time for the buyer to open his eyes to an opportunity. Today's prices on many items are lower than they cost to make, even below a normal factory cost, and it is absolutely certain that sooner or later they must advance. Such a condition is in spots only and caused to some extent by those so in need of a dollar in currency as to disregard the more than dollar in the material they sell. Buyers have a good chance right now, if they have the money to spend, to make a real investment in a good many lines, and it would not be a half bad idea for jobbers and dealers to cast a careful eye on the price situation as it is today on wiring devices."

The company points out that on Oct. 19 prices were reduced 10 to 15 per cent on its open knife switches, slate and porcelain fuseblocks. L. L. Brastow is sales manager.

Large Electric Vehicle Garage Opened in Chicago

An electric garage for the accommodation of electric trucks and vehicles has been opened recently by the Electric Storage Battery Company in Chicago. The garage is on the south side of the city on Twenty-fifth Street and is large enough to accommodate forty trucks. It will be used exclusively for garaging electric vehicles.



NEW CHICAGO ELECTRIC VEHICLE GARAGE WITH FORTY TRUCK CHARGING CAPACITY

It is felt that the new Chicago garage will be of distinct benefit to the owners of one or two trucks rather than the owners who maintain their own battery service. There are forty charging circuits on the switchboard, allowing each car its own individual charging circuit, and thus it will not be necessary to hurry one car in order to make room for another vehicle. In addition, these small fleet owners will have at their disposal the services of an organization of factory battery experts.

Considerable care will be exercised at the new garage, according to the announcement, to have all charging done according to the instructions furnished by the battery manufacturer of the particular battery with which the truck is equipped. In case it is necessary to boost at high rate two charging circuits with a capacity of 300 amp. have also been installed.

Anaconda Receives Large Order From Chilean State Railway

An order for the trolley wire to be used by the Chilean State Railways in the electrification of their system has been received by the Anaconda copper Mining Company, New York City. The copper involved in the order is 1,000,000 lb., but before the work is completed much more will probably be used.

Westinghouse Issues New Series of Publicity Matter

A number of leaflets and publications have just been issued by the Westinghouse Electric & Manufacturing Company discussing and illustrating a number of its products and the uses to which they may be put. The series includes No. 3,665, on motors for elevator service; No. 57, on type No. LC crane safety switches; No. 56, on insurance against loss by stock renewal parts; No. 1,732, describing and illustrating inclosed float switches for use on motor operation pumps to maintain a water level in tanks or reservoirs, and No. 1,950, on electric motor drive for power pumps. Vol. 3, No. 1, of the Westinghouse Electrification Data is also being distributed. This issue treats of the economy of railroad electrification and includes a portion of the progress report made by the Superpower Survey to the ex-Secretary of the Interior. Among the installations mentioned are the Norfolk & Western Railroad, New York, New Haven & Hartford Railroad, Erie Railroad, Grand Trunk Railroad and Chicago, Milwaukee & St. Paul. Another publication discusses electric railway problems of 1921.

The Peerless Drawn Steel Company, Massillon, Ohio, manufacturer of cold-drawn screw stock, shafting and alloy steels, announces the appointment of Clyde E. Dickey, Woolworth Building, 233 Broadway, New York City, as its sales representative for the metropolitan district.

The Universal Crane Company, Elyria, Ohio, announces that George L. Sawyer, formerly sales manager of material handling machinery for the Barber-Greene Company, Aurora, Ill., has been appointed as its representative in the New York field in the sale of Universal cranes. His offices are at Allied Machinery Center, 141 Center Street, New York City.

The National Electric Condenser Company, Pennsylvania Building, Philadelphia, has obtained the exclusive rights in the United States from the Etablissement Industriel, L. Segal et Cie., for static condensers. The company is now importing these condensers and announces that it has a fair stock on hand and intends to begin manufacture soon. The contract with Segal et Cie., it is understood, calls for manufacture within one year. These condensers are now undergoing tests by some of the larger Eastern utilities.

Foreign Trade Notes

PRODUCTION OF ELECTRICAL EQUIPMENT IN SWITZERLAND.—The manufacture of electrical machinery and equipment and apparatus for utilizing electrical energy, according to the commercial and industrial handbook on Switzerland issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce, holds a leading place in the Swiss metal industry. More than 20,000 employees are occupied in different establishments in the country in the production of such equipment, ranging from household articles to motors of from one-hundredth of a horsepower to many hundred horsepower and electric locomotives for use on federal railways. The production of practically all of these articles greatly exceeds the demand, with the result that a foreign trade has been built up amounting in 1919 to nearly 40,000,000 francs. Imports of complete electric machines are very small. Prior to the war the bulk of the copper wire for railway electrification and other purposes was imported, but with government assistance the manufacture of wire has been much developed and the copper is imported largely in the form of bars. Certain types of large insulators for use in connection with high-tension voltage, especially on railways, are not manufactured in the country, or are not of satisfactory quality. The continuance of railway electrification will furnish a market for a limited quantity of this equipment. Switch equipment, more especially for out-door use, is needed by the railways and must be imported.

PROPOSED WATER-POWER DEVELOPMENT IN CZECHOSLOVAKIA.—A law has recently been passed by the Czechoslovakian Government, according to *Commerce Reports*, providing for the systematic development of the water-power resources of the country. In accordance with this law the state will take over the utilization of water power and construction of hydro-electric plants, while the construction of the distribution systems and auxiliary steam plants will be left to private companies. In the latter case at least 60 per cent of the capital will be held by the state or local authorities. The National Assembly has assigned 75,000,000 crowns (about $750,000 at present exchange) toward the electrification of the country. This sum is to be distributed over the budgets up to 1928. The unused water power of Czechoslovakia today is estimated at more than 1,600,000 hp. This plan also contemplates ultimately a system of nine steam plants in the coal districts of the country, which will operate in conjunction with the hydro-electric project. Standard transmission pressures of 22,000 volts and 100,000 volts are proposed.

ELECTRIC RAILWAYS FOR NORWAY—The Norwegian Storthing has granted a concession to "A/S Akersbanerne," according to the *Electric Times*, for the construction of an electric railway from the center of Christiania to Ostensjo, a distance of about 8 km. Work on this line will probably commence simultaneously with the construction of the Majorsteun-Sognsvandet railway, a concession for which was granted recently.

PROPOSED WATER-POWER DEVELOPMENT IN JUTLAND, DENMARK.—The commission appointed in November, 1920, to study the question of utilizing the water power of Jutland to generate electricity, according to the *Electrical Industries*, has submitted its report. The commission examined sixteen schemes in connection with water power developments and recommends, subject to further comprehensive investigations, the establishment of seven plants, to be located at Vestbirk, Holstebro, Bur i Ahlersgaard, Skjern, Karlsgaarde and Ansaager. The cost is estimated at about 30,000,000 kronen.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number.

A mercantile firm in Spain (No. 258) desires to purchase and secure an agency for the sale of flashlights and dry batteries.

A manufacturing firm in Mesopotamia (No. 257) desires to secure the representation of manufacturers of copper and brass sheets.

ELECTRICAL EQUIPMENT FOR RAILWAYS IN AUSTRALIA.—Tenders will be received by the Victorian Government Railway Commissioners, Melbourne, Australia, until Jan. 4, 1922, according to *Electrical Industries*, for furnishing the following equipment: 60 tons of galvanized telegraph wire, 23 steam meters and accessories for Newport power house, and 150 electric train stops for power signaling. Particulars may be obtained at the inquiry room, Department of Overseas Trade, 35 Old Queen Street, London, S.W.1, England.

HYDRO-ELECTRIC PROJECT FOR AUCKLAND, NEW ZEALAND.—The Dominion government, according to *Electrical Industries*, has adopted the Arapuni hydro-electric scheme to supply electricity in Auckland. The proposed plan provides for a water-power development of 50,000 hp. as soon as possible, with an ultimate capacity of 162,000 hp. The cost is estimated at approximately £1,879,000. Work is not to be started until funds are available.

EXTENSIONS TO STOKE-ON-TRENT ELECTRIC SYSTEM.—Plans have been approved by the Corporation of Stoke-on-Trent, according to the *Electrician*, for the proposed extensions at the Hanley power house, to cost about £200,000.

New Apparatus and Publications

CHAIN SCREEN DOORS.—The E. J. Codd Company, 700-708 Carolina Street, Baltimore, has issued a booklet covering the "Wiegand" patent-chain screen doors for furnaces and ovens.

ELECTRIC CONDUIT.—The Dahlstrom Metallic Door Company, Jamestown, N. Y., is distributing a twelve-page booklet describing its "Condue-Base," which is a combination metal base, electric conduit for low-tension and high-tension wires and a continuous electric outlet box.

LUBRICATION.—"Diesel Engines" is the subject of the leading article in the September issue of *Lubrication*, published by the Texas Company, 17 Battery Place, New York City.

BLOWERS.—The Coppus Engineering & Equipment Company, Worcester, Mass., has recently placed on the market a new propeller blower, known as the Coppus "Vano" blower.

LATHE AND MICA UNDERCUTTER.—David W. Onan, 43 Royalston Avenue, Minneapolis, is distributing a leaflet describing the "Onan" lathe and mica undercutter.

ILLUMINATING SHADES.—Tindal & White, Inc., 329 East Twenty-second Street, New York City, is distributing a circular describing the "Perfection" electric illuminating shade.

ELECTRIC HEATERS.—The Hale Electric Manufacturing Company, 1073 Power Avenue, Cleveland, manufacturer of "Halelectric" radiators, is distributing a new folder on its electric air heater.

AIR TIGHT DOORS.—The Conveyors Corporation of America, 326 West Madison Street, Chicago, is distributing a circular describing its "American" air-tight door for ash pits, boiler settings, coke ovens, etc.

AUTOMATIC STARTER.—A new automatic starter for direct-current motors of 10 hp. capacity or less has recently been placed on the market by the Automatic Reclosing Circuit Breaker Company, Sixth and Wesley Avenues, Columbus, Ohio.

SOLDERING PASTE.—A new soldering paste has recently been placed on the market by the Killark Electric Manufacturing Company, 3940-3948 Easton Avenue, St. Louis, Mo.

SOCKET.—The Tremont Products Company, 216 High Street, Boston, has recently developed a new pull socket.

LAMPS.—The Multiple Electric Products Company, Inc., 450 Fourth Avenue, New York City, has placed on the market an "Ediswan" base lamp and adapter and also a concentrated filament lamp.

ARC WELDING RESISTORS. — The American Steel & Wire Company, Chicago, is distributing a bulletin describing two resistors for welding rail bonds recently developed by the company.

DRY VACUUM PUMPS.—Bulletin 710, issued by the Chicago Pneumatic Tool Company, Chicago, describes its steam, belt and motor driven pneumatic dry vacuum pumps.

PNEUMATIC TOOLS. — The Chicago Pneumatic Tool Company, Chicago, has issued a special publication, 674, covering its different types of pneumatic tools.

DRILLING AND AUTOMATIC TAPPING MACHINES.—The Cincinnati Hy-Speed Machine Company, Cincinnati, has issued circulars covering its "Hy-Speed" drilling and automatic tapping machines.

CRANES.—The Whiting Corporation, Harvey, Ill., has issued a catalog 158, superseding 151, describing its standard crane designs. It also contains several tables of standard clearances.

GARAGE AND MACHINE WELDING TORCH.—The Davis-Bournonville Company, Jersey City, N. J., has issued a circular describing its garage and small machine shop welding torch and carrying outfit.

ELECTRIC IRON. — The Commercial Electrical Supply Company, corner Broadway and Spruce Streets, St. Louis, has recently placed on the market a small electric iron known as the "Tommy iron," designed for the use of milliners, hat manufacturers, dressmakers, etc.

ELECTRIC WATER HEATER. — The Standard Electric Stove Company, Toledo, Ohio, is distributing a leaflet describing the new circulation electric water heater recently developed by the company.

PORTABLE ELECTRIC BLOWERS.—"Fights 'Dustruction'" is the title of a folder issued by the Clements Manufacturing Company, 609 Fulton Street, Chicago, covering its "Cadillac" portable electric blowers.

New Companies

THE SELSO COMPANY, Ogdensburg, N. Y., has been organized by H. J. Parker, M. H. Stevenson and R. C. Sanford, all of Ogdensburg, to manufacture electrically operated water heaters and parts. The company is capitalized at $50,000.

THE ENCO ELECTRIC NOVELTY COMPANY, New York, N. Y., has been incorporated with a capital stock of $24,000 to manufacture electrical specialties. The incorporators are F. David, M. H. Cohen and M. Smiley. The company is represented by Frederick Lese, 277 Broadway.

THE NATIONAL LIGHT & ELECTRIC COMPANY, Newark, N. J., has been incorporated by George Ollendorf, Albert R. Hamerslag and Harry Hirsch, Newark, to manufacture electric lamps, electrical fixtures and kindred equipment. The company is capitalized at $100,000. Harry A. Friedman, 9 Clinton Street, represents the company.

FORD & MANION, INC., Wilmington, Del., has been incorporated with a capital stock of $100,000 by Joseph J. Ford and Francis T. Manion, Wilmington. The company proposes to manufacture electrical heating equipment and appliances. Henry R. Isaacs, Equitable Building, represents the company.

THE O. & R. ELECTRICAL SUPPLY COMPANY, Monroe, N. Y., has been incorporated with a capital stock of $100,000 to manufacture electrical machinery devices and supplies. R. W. Smith, Monroe, and others are incorporators.

THE HANLEY ELECTRICAL COMPANY, Lawrence, Mass., has been incorporated with a capital stock of $15,000 to manufacture electrical appliances. The incorporators are Thomas J. Hanley and Charles V. Hanley of Methuen and William J. Kelleher of Lawrence.

THE MERRILL COMPANY, Ipswich, Mass., has been incorporated by John Merrill and Arthur C. Damon of Ipswich and Louis H. Harriman of Haverhill. The company is capitalized at $25,000 and proposes to manufacture electrical appliances.

THE UNITED LIGHT & POWER COMPANY, Iaeger, W. Va., has been incorporated with a capital stock of $25,000 to operate an electric light, heat and power plant in Iaeger. The incorporators are F. B. Lamp, H. P. Musser, C. E. Elson, M. D. Jennings and William T. Lively, all of Charleston.

JOHN D. OSGOOD, INC., Haverhill, Mass., has been chartered with a capital stock of $35,000 to manufacture electric heating appliances. John D. Osgood, 10 Falmouth Street, is president and treasurer.

THE RADIO DEVELOPMENT COMPANY, Springfield, Mass., has been incorporated with a capital stock of $25,000 to manufacture radio equipment. The officers are Frank W. Sickles, president, and A. Roul Silber, treasurer, both of Springfield.

Record of Electrical Patents

Notes on United States Patents

(Issued Oct. 11, 1921)

1,393,346. INSULATING COMPOSITION OR MATTER; Frank J. Cook, Cleveland, Ohio. App. filed Aug. 19, 1920. For use as composition in which electric resistance wire is embedded.

1,393,352. TELEPHONE SYSTEM; William L. Dodge, Maplewood, N. J. App. filed Sept. 22, 1919. Signals for plurality of trunk lines controlled over a single path.

1,393,368. RADIANT REFLECTOR; George J. Henry, San Francisco, Cal. App. filed March 10, 1920. Heater of the radiant type.

1,393,369. APPARATUS FOR TRANSLATNG ELECTRICAL VARIATIONS; Peter C. Hewitt, Ringwood Manor, N. J. App. filed March 12, 1915. Receiver for wireless telegraphy.

1,393,370. PROCESS OF MAKING ALUMINUM NITRIDE AND OTHER CHEMICAL SUBSTANCES; William Hoopes, Pittsburgh, Pa. App. filed Sept. 19, 1919. Means for heating charge.

1,393,371. APPARATUS FOR MAKING ALUMINUM NITRIDE AND OTHER CHEMICAL SUBSTANCES; William Hoopes; Pittsburgh, Pa. App. filed Sept. 19, 1919. Means for heating charge.

1,393,372. PROCESS OF MAKING ALUMINUM NITRIDE AND OTHER CHEMICAL SUBSTANCES; William Hoopes, Pittsburgh, Pa. App. filed Sept. 19, 1919. Means for heating charge.

1,393,373. ELECTRICAL RESISTOR; William Hoopes, Pittsburgh, Pa. App. filed Oct. 2, 1919. For nitrifying aluminous charges.

1,393,375. THERMOCOUPLE; Matthew A. Hunter, Troy, N. Y. App. filed Feb. 17, 1920. One element of an alloy having a high melting point and resistant to oxidation.

1,393,395. ELECTRIC MACHINE; Otto Pletscher, Albisrieden, Switzerland. App. filed April 14, 1917. For production of light in electric pocket lamps.

1,393,398. INSULATOR; Howard N. Richards, Pittsburgh, Pa. App. filed Feb. 19, 1921. For supporting trolley conductors.

1,393,404. SAFETY DEVICE FOR ELECTRICALLY OPERATED SYSTEMS; William S. Smith, Cambridge, Mass. App. filed Aug. 3, 1918. For elevators, etc.

1,393,427. ELECTRIC TOASTER; Emil A. Christoph, Chicago, Ill. App. filed July 1, 1920. Horizontal domestic type.

1,393,429. TELEPHONE SYSTEM; Henry P. Clausen, Mount Vernon, N. Y App. filed July 12, 1917. Trunking arrangements between exchanges.

1,393,430. TELEPHONE SYSTEM; Henry P. Clausen, Mount Vernon, N. Y. App. filed Jan. 4, 1918. Systems wherein both automatic and manual lines are used.

1,393,433. MOTOR-GOVERNING DEVICE; William W. Dean, Wilmette, Ill. App. filed May 16, 1919. For use in connection with electric phonograph motors.

1,393,439. SYSTEM OF CONTROL; Arthur J. Hall, Wilkinsburg, Pa. App. filed Jan. 5, 1918 Control of electric motors and generators located upon mechanically coupled cabs of a locomotive.

1,393,442. CONTROL SYSTEM; Rudolf E. Hellmund, Swissvale, Pa. App. filed Sept. 27, 1916. For governing operation of propelling motors of electric vehicles.

1,393,458. CATENARY TROLLEY-CLAMPING EAR; Paul G. Schwarz, Indianapolis, Ind. App. filed Dec. 22, 1919. Catenary hanger for overhead trolley.

1,393,465. TELEPHONE-EXCHANGE SYSTEM; Dawson M. Taggart, East Orange, N. J. App. filed Sept. 4, 1919. Common and local battery lines may be interconnected.

1,393,467. PROCESS FOR PRODUCING SEPARATORS; Charles J. Thatcher, New York, N. Y. App. filed Dec. 13, 1918. Process for impregnating pores of materials.

1,393,471. SUBMARINE SIGNALING; Raymond L. Wegel, New York, N. Y. App. filed Oct. 9, 1919. For receiving vibrations transmitted through water.

1,393,472. TIDE MOTOR; Harry Williams, Return, Va. App. filed Feb. 28, 1920. Power from the tide utilized for commercial purposes.

1,393,483. ELECTRODE; Joseph M. Askin, Chicago, Ill. App. filed Dec. 5, 1919. Bobbin type involving a core.

1,393,491. TROLLEY HANGER; Leland F. Brahmer, Edgewood Park, Pa. App. filed July 30, 1920. Means for holding lock washers in assembled position.

1,393,502. MACHINE-SWITCHING TELEPHONE SYSTEM; Henry P. Clausen, Mount Vernon, N. Y. App. filed Dec. 26, 1917. Established connection may be more closely supervised.

1,393,503. ELECTRICAL SYSTEM; Henry P. Clausen, Mount Vernon, N. Y. App. filed Aug. 19, 1918. For the automatic charging of storage batteries.

1,393,520. INCLOSED ARC DEVICE AND THE METHOD OF STARTING THE SAME; Ernst Friederich, Berlin, Germany. App. filed Oct. 13, 1914. Arc operated in an inclosed envelop between electrodes of refractory material.

1,393,521. MACHINE-SWITCHING TELEPHONE SYSTEM; Charles L. Goodrum, New York, N. Y. App. filed April 27. 1917. Group-selecting switches.

1,393,522. TELEPHONE-EXCHANGE SYSTEM; Charles L. Goodrum, New York, N. Y. App. filed Oct. 25, 1918. Circuit arrangements for selector switches.

1,393,530. TROLLEY - WIRE EXTENSION SPLICE; Mike W. Hermes, Bulger, Pa. App. filed March 18, 1921. Adjusted to accommodate expansion and contraction.

1,393,531. ELECTRIC INCUBATOR; John A. Howard, Sr., West New Brighton, N. Y. App. filed July 3, 1920. Automatic control of current.

1,393,558. TELEPHONE-EXCHANGE SYSTEM; James L. McQuarrie, Montclair, N. J. App. filed Aug. 7, 1919. Circuit arrangements for various switches.

1,393,559. TELEPHONE-EXCHANGE SYSTEM; James L. McQuarrie and Charles L. Goodrum, New York, N. Y. App. filed Aug. 7, 1919. Arrangement for controlling selector switches.

1,393,594. MEANS FOR PRODUCING HIGH-FREQUENCY OSCILLATIONS; William C. White, Schenectady, N. Y. App. filed June 3, 1918. Receiving system of heterodyne type.

1,393,602. ELECTRICAL CONDENSER; Ernest A. Bayles and Harold Higham, Helsby, England. App. filed Dec. 22, 1919. Made of laminae of paper and metal.

1,393,635. ELECTRICAL BRUSH; Helen R. Mondy, Atlantic City, N. J. App. filed Feb. 12, 1921. For drying the hair.

1,393,674. BATTERY CONNECTOR; Walter S. Doe, Kent, Ohio. App. filed Oct. 25, 1919. Non-corrosive and acid-proof.

1,393,675. FLASHLIGHT; Walter S. Doe, Kent, Ohio. App. filed Nov. 2, 1920. New and improved switch.

1,393,685. ANNUNCIATOR DROP; Charles J. Henschel, Brooklyn, N. Y. App. filed April 25, 1919. Suitable for use on shipboard.

1,393,715. SYSTEM OF CONTROL; Normal W. Storer and Rudolf E. Hellmund, Pittsburgh, Pa. App. filed Feb. 10, 1916. Automatic regenerative control of electric-railway motors.

1,393,727. CALL-DISTRIBUTING SYSTEM; Samuel B. Williams, Jr., Brooklyn, N. Y. App. filed Nov. 28, 1919. Automatic switches for distributing calls.

1,393,728. TELEPHONE-EXCHANGE SYSTEM; S. B. Williams, Jr., Brooklyn, N. Y. App. filed Dec 8, 1919. Automatic switches for establishing talking connections.

(Issued Oct. 18, 1921)

1,393,732. ELECTRIC HEATING UNIT; Charles C. Abbott, Pittsfield, Mass. App. filed Dec. 17. 1920. Simple, compact and reliable.

1,393,737. ELECTRIC METER; Edwin C. Ballman, St. Louis, Mo. App. filed Nov. 15, 1918. Constant magnetic field and magnetic field varying with current.

1,393,739. ELECTRIC BATTERY; Raymond C. Benner and Harry F. French, Fremont, Ohio. App. filed Jan. 16, 1919. Dry cell.

1,393,750. SECTOR CABLE; Hilton P. M. Carter, Montreal, Quebec, Can. App. filed Feb. 28, 1920. Without distortion of form or wires themselves.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

BOSTON, MASS.—The Edison Electric Illuminating Company of Boston has been granted permission by the Massachusetts Department of Public Utilities to issue 45,056 shares of stock, par $100, at $130 a share, to take up outstanding indebtedness and for extensions.

Middle Atlantic States

BROOKLYN, N. Y.—Bids will be received by Thomas J. Drennan, fire commissioner, eleventh floor, Municipal Building, New York City, until Nov. 15, for furnishing, delivering and installing protector board, jack and test board, relay boards, dispatcher's receiving and transmitting board, automatic transmitters, control table, cable and wire, conduit, cable racks and miscellaneous appurtenances in new central office, borough of Brooklyn, N. Y.

BUFFALO, N. Y.—The Bison Ice & Coal Company, Rapin Street near Doat Street, is planning the construction of a one-story addition, 12 ft. x 84 ft., to its ice-manufacturing plant. Fred Teichert is treasurer.

CAROGA LAKE, N. Y.—The Kolenaka Electric Light Company, Johnstown, recently incorporated with a capital of $15,000, contemplates the construction of a generating plant to supply electricity for street-lighting and domestic purposes at Caroga Lake. The plant will be driven by a Diesel engine. T. H. Cepereley, Argusville, is in charge.

ELLISBURG, N. Y.—The Adams Electric Light & Power Company has been granted permission by the Public Service Commission to erect a distribution system in the village of Ellisburg. The commission has also approved franchise granted by the town and village authorities.

NEW YORK, N. Y.—Bids will be received by R. W. Rodman, superintendent of plant operation of the Board of Education of the School District of the city of New York, room 515, Municipal Building New York City, until Nov. 21, for electric ash hoists in Public Schools 3, 4, 5, 46, and 48, borough of the Bronx, and in Public Schools 84, 85, 109, 148 and 168, and installing ash trolley in Public School 84, borough of Brooklyn. Bids will also be received until the same date by C. B. J. Snyder, superintendent of schools, room 2800, Municipal Building, New York City, for installing electric wiring and fittings in new Public School 54, Sanford Street, between DeKalb and Willoughby Avenues, borough of Brooklyn.

SCOTCH PLAINS, N. J.—Plans are under consideration by the Board of Freeholders of Union County, Court House, Elizabeth, N. J., for extensions and improvements to the power plant at the county institution at Scotch Plains, to cost about $25,000.

HUNTINGTON, PA.—The consolidation of the Cove Electric Company, the Roaring Spring Light, Heat & Power Company and the North Woodberry Electric Company, to operate under the first-named company has been authorized by the Public Service Commission. Extensive improvements and extensions are under consideration.

LANCASTER, PA.—The Lancaster Milk Products Company, Inc., Hollinger, Pa., is planning the construction of a power plant to be used in connection with its proposed plant to be built at 623 Thirty-second Street, Lancaster, to cost about $100,000. John Harmon, 48 North Queen Street, Lancaster, is architect.

NEW BRITAIN, PA.—The New Britain Improvement Association has obtained sufficient funds to provide for the installation of an electric lighting system in this village.

PHILADELPHIA, PA.—New bids, it is reported, will be asked by the Department of City Transit, City Hall, for a power house at Cumberland and Kensington Streets.

PHILADELPHIA, PA.—The Department of Public Works, Bureau of City Property, City Hall, is considering the construction of a power house for the buildings comprising Independence Hall, Sixth and Chestnut Streets. John P. B. Sinkler, Otis Building, is architect.

POTTSVILLE, PA.—Application has been made by the Eastern Pennsylvania Light, Heat & Power Company to the Public Service Commission for permission to install and operate a system in certain sections of Schuykill County.

TEMPLETON, PA.—Plans are under consideration by the Templeton Limestone Company, Kittanning, for the construction of a crushing plant, 30 ft. x 60 ft., and a power house, 25 ft. x 25 ft., at its property at Templeton near Kittanning, to replace its works recently destroyed by fire. W. L. Snyder is superintendent.

TOWANDA, PA.—The Towanda Electric Illuminating Company is considering the construction of a new power house.

WEST MIDDLESEX, PA. — The Shenango Valley Electric Company, Sharon, is considering furnishing electricity for lamps and motors in West Middlesex. Mark Pendleton is superintendent.

FROSTBURG, MD.—The power house, consisting of boiler and engine departments, at Mine 13 of the Consolidation Coal Company, Consolidation, near Frostburg, was recently destroyed by fire. The plant, it is understood, will be rebuilt.

RICHWOOD, W. VA.—The Cherry River Paper Company is planning the erection of a one-story power plant, 40 ft. x 150 ft., to cost, with machinery, about $250,000. George Snyder is assistant superintendent.

HOPEWELL, VA.—The local power plant and waterworks of the Du Pont Chemical Company has been acquired by the Industrial Service Corporation, Hopewell. The new owner, it is understood, will make extensions and improvements. J. F. Muhlig is general manager.

WASHINGTON, D. C.—The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids for furnishing the following: Until Nov. 22, Washington, Schedule 8992, 300 porcelain insulators; until Nov. 29, Mare Island, Schedule 8994, 10,000 ft. single conductor lighting and power wire.

North Central States

CLEVELAND, OHIO—An ordinance providing for the expenditure of approximately $52,000 for extensions to the municipal electric light and power system has passed its first reading.

CLEVELAND, OHIO—The City Council has authorized the installation of an ornamental lighting system on Euclid Avenue from East Ninety-third to East 107th Street, and on East 105th Street from Fairmount Street to the proposed extension of Carnegie Avenue, to cost about $40,000.

COLUMBUS, OHIO—Bids will be received by C. L. Steele, secretary of the board of trustees of the Ohio State University, until Nov. 18, for the construction of a power house, 18 ft. x 204 ft., to cost about $300,000. J. N. Bradford, Ohio State University, Columbus, is architect.

MARIETTA, OHIO—The City Council has authorized improvements to the municipal electric light plant, to cost $5,000. The plans provide for replacing the three arc machines now in use with a two-phase, 2,200-volt generator. The distribution lines will be overhauled and stand-arc lamps will be substituted for the present streets lamps. G. H. Gamper, 220 New First National Bank Building, Columbus, is engineer.

STEUBENVILLE, OHIO — The Ohio Power Company is considering plans for the construction of a new substation, to cost about $50,000.

WARREN, OHIO. — The Ohio Public Service Company has disposed of an issue of $5,100,000 in bonds, the proceeds to be used for improvements and extensions to its system.

CONNERSVILLE, IND.—Arrangements, it is reported, are being made by the Interstate Public Service Company, Shelbyville, for the purchase of the local power plant of the Hydro-Electric Company, which will be consolidated with its distribution system. Connection, it is understood, will be made wth the New Castle plant of the Interstate Company, which contemplates extensions and improvements.

SPRINGFIELD, ILL.—Improvements to be made in the near future at a cost of about $3,000,000 are under consideration by the Springfield Gas & Electric Company and the city authorities. The work includes construction of underground conduit for electric light and power wires, ornamental lighting system, purchase of the Fourth Street lighting system by the city, etc. For further information address A. D. Mackie, vice-president of the Springfield company.

BELOIT, WIS.—The Council is considering changes to the street-lighting system in Beloit, providing for replacing arc lamps with incandescent lamps. The proposed new system will comprise 328 units, each requiring a 250-cp. incandescent lamp.

DODGEVILLE, WIS.—The Wisconsin River Power Company, Gay Building, Madison, is planning the construction of a two-story electric substation, 60 ft. x 86 ft., in Dodgeville, to cost about $55,000.

OCONTO FALLS, WIS.—Work will be started soon, it is reported, by the Union Manufacturing Company, which is the hydro-electric power division of the Continental Paper & Bag Mills of New York and serves the paper mills at Oconto and Marinette, Wis., on extensions to its plant. The output will be increased from 1,500 hp. to 2,750 hp.

WAUWATOSA, WIS.—The Board of Administration has appointed Vaughn & Meyer, engineers, to make a survey to determine the advisability of building a central power, light and heat plant for use in connection with the county institutions at Wauwatosa.

BARNESVILLE, MINN.—Improvements to the electric lighting system in Barnesville are under consideration. E. Aamoot is city clerk.

CRANE, MO.—The J. P. Cantrell Oil Company is considering the construction of an electric light and ice plant.

HOLTS SUMMIT, MO.—The Central Missouri Coal Mining Company, 314 Central Trust Building, Jefferson City, is planning the installation of engines, boiler, pumps, conveying apparatus and other power equipment to cost about $75,000, at its properties at Holts Summit. John McManus is secretary and treasurer.

ST. LOUIS, MO.—The St. Louis Lead & Oil Works, International Life Building, has awarded a contract for the construction of a one-story addition to its power house to Fillespie & Daly, International Life Building.

NEMARA CITY, NEB.—The transmission line of the Nebraska Gas & Electric Company will be extended from Shubert to Nemara City to provide electricity for light and power in the latter town.

RANDOLPH, NEB.—Extensions to the municipal electric light plant, to cost about $65,000 are under consideration. C. Blizzard is clerk.

NEODESHA, KAN. — Bonds to the amount of $195,000 have been voted for electric light and water improvements. It is proposed to install new engines in the power plant, replacing the steam plant now in use with oil-engines and motor-driven pumps. An ornamental lighting system will be erected on two of the principal streets of the city.

OTTAWA, KAN.—A movement has been started to link Melvern, Lyndon, Waverly, Michigan Valley and Overbrook with the transmission line from Ottawa to Quenemo, on which work is under way.

Southern States

WINSTON-SALEM, N. C.—Bids will be received by the city of Winston-Salem, N. C., until Nov. 16, for the construction of the Academic Arts Building, power house and other work in conection with the Richard J. Reynolds High School. Plans and specifications may be obtained from the office of Wiley & Wilson, Lynchburg, Va., consulting engineers.

GREEN COVE SPRINGS, FLA.—Bonds to the amount of $150,000 have been voted for extensions to the municipal electric light and water plants, construction of sewers, etc.

LAKE WORTH, FLA.—Plans are under consideration for the installation of a larger engine at the municipal electric light plant. Ward Randolph is city engineer.

WHITE PINE, TENN.—The White Pine Power & Light Company is contemplating the construction of an electric power plant, 60 ft. x 60 ft. G. M. Felmet is interested.

WILSON, OKLA.—The Council is considering issuing $70,000 in bonds for extensions to the municipal electric lighting plant and system.

SAN ANTONIO, TEX.—The Texas Central Power Company, recently organized, is planning the operation of electric power plants to supply electricity in Victoria, Cuero, Bishop, Kingsville and other points in this section. R. W. Morrison, San Antonio, is interested in the company.

VERNON, TEX.—The City Commissioners are considering the establishment of electric light and ice plants in Vernon.

WORTHAM, TEX.—The installation of an electric light plant in Wortham is under consideration by the City Council.

Pacific and Mountain States

SEATTLE, WASH.—The Puget Sound Power & Light Company has entered into contract with the Washington Coast Utilities Company of Wenatchee, to supply electricity for the Wenatchee Valley district and Chelan and Douglas Counties. The present plans provide for the erection of a transmission line from the present Snoqualmie plant of the Puget Sound company. The Washington Coast Utilities Company recently took over the properties of the old Wenatchee Gas & Electric Company. William H. McGrath is vice-president of the Puget Sound company.

VANCOUVER, WASH.—The Lewis River Hydro-Electric Power Company, Vancouver, has plans under consideration for the construction of a hydro-electric generating plant on the North Fork of the Lewis River, near Kearns, Wash.

YAKIMA, WASH.—Word has been received from Washington, D. C., that the federal government has authorized the expenditure of $3,600,000 on reclamation projects in Washington during the coming winter, half of which amount is to be spent on the Kennewick unit of the Sunnyside Canal. The project includes a diversion dam, headworks at Prosser, construction of a power canal and pumping plant.

PORTLAND, ORE.—Malcolm J. Anderson of Portland has applied to the state engineering department for authority to appropriate 75 sec.-ft. from the south fork of the Coquille River to develop 13,261 hp. The project includes a dam 100 ft. high and 400 ft. long. The cost is estimated at $750,000.

SAN DIEGO, CAL. — The Bureau of Yards and Docks, Navy Department, Washington, D. C., is contemplating the installation of a street-lighting and fire-alarm system in San Diego. Applications accompanied by a deposit of $10 may now be filed for plans and specifications (4526), and necessary data for bidding will be forwarded in the near future. All communications should be addressed to the chief of the Bureau of Yards and Docks.

SAN FRANCISCO, CAL.—R. W. Hawley, San Francisco, it is reported, has been granted a permit by the Federal Power Commission, Washington, D C., providing for a power development scheme on Silver Creek. Under this permit it is planned to equalize the flow of Silver Creek by the construction of two reservoirs, the water being utilized through three power plants.

STOCKTON, CAL.—Permission has been granted to the Western States Gas & Electric Company by the Railroad Commission to proceed with the construction of a hydro-electric plant, to have an ultimate capacity of 100,000 hp., on the south fork of the American River. Extensions will also be made to its present plant to provide for an increase in capacity to 56,000 hp.

GLENDIVE, MONT.—The Eastern Montana Light & Power Company is considering extensions and improvements to its distribution system in Glendive.

Canada

WINNIPEG, MAN. — The Manitoba Power Company, Ltd., Winnipeg, Man., has awarded general contract for the construction of its power plant at Great Falls, to cost about $5,500,000 to Fraser, Brace & Company, Ltd., 83 Craig Street, West, Montreal, Que. Separate bids will be asked for machinery and equipment. F. H. Martin is engineer and F. J. Pratt is purchasing agent.

MAMORA, ONT.—The Pearce Company has plans under consideration for rebuilding the power house at its woolen mills, recently destroyed by fire.